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PRIZE-ESSAYS

AND

TRANSACTIONS

OF THE

HIGHLAND SOCIETY OF SCOTLAND.

VOL. VIII.

WILLIAM BLACKWOOD, EDINBURGH; AND
T. CADELL, STRAND, LONDON.
MDCCCXXXI.

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APPENDIX.

PREMIUMS OFFERED BY THE SOCIETY IN 1830.

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PRIZE ESSAYS AND TRANSACTIONS

OF

THE HIGHLAND SOCIETY OF SCOTLAND.

PRELIMINARY NOTICE.

Agreeably to the practice hitherto followed on the publication of each volume of the Transactions, the Society has directed a summary view to be given of the principal subjects which have recently occupied its attention.

The extremely low price of British Wool, and consequent embarrassment of a large portion of the landowners and farmers in Scotland, interested in that production, having attracted the notice of the Society, a Committee was, some time ago, appointed to inquire into the causes of that depression, and to report to the Society as to the probability of a part of its funds being effectively employed in promoting such improvements as would tend to raise the value of the wool produced in the mountainous districts of Scotland.

In prosecuting these inquiries, the committee received a variety of communications, pointing out specific changes in the prevalent system of management, as likely to be productive of important advantages to the sheep-farmer. The committee, after a careful consideration of the subject, reported it as their opinion, that, from the magnitude and importance

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of the question, and the inability of the Society, consistently with the great variety of other subjects demanding its attention, to devote such a portion of its funds to the purposes required, as would be really effectual, it would be proper that the whole subject should be brought under the notice of Government, and its co-operation and support solicited. This suggestion was approved of, and a memorial, founded upon the report of the committee, ordered to be presented to the Lords Commissioners of the Treasury. In this memorial, the attention of their Lordships was more especially directed to the following branches of inquiry, as bearing most immediately upon the best means of increasing the value of mountain wool:

1*st*, The possibility of substituting some preparation in place of the mixture of tar and butter, now generally used for salving sheep.

2*d*, The discovery of some chemical mode of depriving the tar of the colouring principle.

It has been found, by experience, that it is not possible to maintain in health and vigour sheep exposed to the vicissitudes of weather which prevail in very high districts, without the application of some substance to the fleece; and a composition of tar and butter has hitherto been thought better adapted for this purpose, than any other of which trial has been made. The tar acts usefully by destroying the insects with which sheep are infested, and by preventing cutaneous diseases, to which, in exposed situations, they are extremely liable. It also affords warmth and protection from the weather, by matting the wool, while the mixture of butter tends to promote its growth and improve its quality.

But there is communicated to the wool, by the application of tar, a stain which quite unfits it for receiving bright colours—such as scarlet and yellow,—and renders it susceptible of the darker dyes in an inferior degree. No method has yet been discovered of effectually obviating this defect; so that

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wool thus salved cannot be used in the manufacture of white goods, and is bought only in small quantities, and at low prices, for the carpet manufactories. The Society has, therefore, offered premiums for the discovery of a salve, which shall possess the useful qualities of the compound of tar and butter, but be free from this serious objection; and a variety of experiments are in progress, in different parts of Scotland, with a view to the attainment of this object. The degree of success which may attend these, the Directors cannot venture to predict.

But they are convinced that much advantage would be gained, were the country in possession of a method of freeing the wool from this stain; and it has occurred to them, that the most advisable mode of prosecuting such a discovery, would be the institution of a series of experiments, under the direction of some eminent chemists, by whom that point might be considered. The Directors are of opinion, that the investigation thus undertaken could hardly fail of success; but they fear that the expense which would be incurred in carrying on these experiments would be beyond the sum which the Highland Society, with the great and increasing claims upon its funds, can apply in the prosecution of the object, however desirable.

The *3d* point to which the attention of the Directors has been turned, is the improvement of the *quality* of the wool, either by greater attention being paid to the fleeces of the sheep selected for breeding, or by the introduction of foreign breeds of sheep producing finer wool.

The Directors have no hope that any material or extensive improvement is to be effected merely by selection from among the animals of the breeds we already possess, or by crossing those breeds,—they being of opinion that each breed is now nearly brought into the *most productive state* of which it is susceptible.

No doubt the quality of the wool of the Cheviot sheep,—

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the only native breed fitted for the Highlands of Scotland, which produces a good clothing wool,—might be in a *slight degree* rendered more fine; but this change would probably be attended with a more than equivalent diminution in the value of the carcass. If any reasonable expectation, therefore, can be entertained of increasing materially the value of the native wool, it has appeared to the Directors that this expectation must be founded, if not entirely, in a great degree, upon the successful introduction of *new breeds* of sheep on our mountain farms.

There is reason to apprehend that the mode of treatment which is followed with regard to the flocks of Germany, Saxony, and Sweden, which yield the very fine wools now chiefly used in the manufacture of cloth, is of a nature too costly to be generally adopted in this country, and is at any rate particularly inapplicable to hill countries. For a supply of the highest priced wools, therefore, we must chiefly depend on the foreign farmer. But there are wools of a quality between these and our own *Southdown and Cheviot Wools*, which are largely imported, and which probably may be produced without that minute attention to *shelter and hard feeding*, which seem indispensable, in a northern climate, to the growth of very fine wool. There are extensive tracts of muir-land in Germany and Sweden, which must be very highly situated, and which probably are subject to a climate, little, if at all, superior to that of the great bulk of Scottish sheep-walks, and where it is difficult to imagine that a degree of attention is bestowed on the flocks beyond that which might be afforded by ourselves. It seems probable, that the wools, to which the Directors allude, are grown there. If this be the case, surely it is worth while to make ourselves accurately acquainted with the system there followed, with the view of introducing it, and the peculiar sheep of that country, into our own. Within the last forty years there has been an entire change in the breed of sheep of the South Highlands. The

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Cheviot has superseded the original black-faced breed, and, in consequence, the value of sheep-farms was nearly doubled. When this change took place, natural difficulties were dreaded fully greater than any which the Directors anticipate in carrying their views on this point into practice. But the Directors are aware that there are difficulties of another kind to be encountered in this case. In the introduction of the Cheviot breed into Scotland, the sheep were easily procured. The country, in which they were to be found, was not distant, and each farmer might, by his own observations, satisfy himself, that the quality of the pasture, and nature of the climate, to which the animal was accustomed, were not very dissimilar to those to which it was to be removed. To enable the proprietors and tenants to proceed with an equal prospect of success, in introducing *foreign sheep*, it occurs to the Directors, that as this degree of information is not accessible to them, it would be highly desirable that it should be supplied. For this end, they would recommend, that some well qualified person should be sent into the principal highly situated wool-growing districts of the north of Europe, with instructions to obtain the utmost possible information regarding the different kinds of fine woolled sheep; that, in prosecuting his inquiries, he should be directed to have particularly in view all those peculiarities of *management, soil, elevation, and climate*, which tend most directly to establish or confute the probability of a successful introduction of the sheep of any given district into this country: and that he should also endeavour to ascertain how these can be procured and imported with the greatest facility. If a report, embracing these points, were obtained, and if it proved of an encouraging nature, there is no doubt that individuals would be found in Scotland ready to enter upon experiments, on an extensive scale, to verify or disprove it. But the Directors expressed their regret, that the funds which the Highland Society could withdraw from the other purposes to which they are applied, would not enable them

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to enter upon such an investigation unaided. They therefore solicited such pecuniary assistance, for the purpose of prosecuting the inquiries before mentioned, as his Majesty's Government might be disposed to grant.

The memorial finally observed, that should it appear to his Majesty's Government that the scheme was not unworthy of attention, but that the information required could be more advantageously obtained under its immediate direction, than through the medium of the Highland Society, the Directors felt assured that the Society would abandon all wish of interfering, satisfied that they had acquitted themselves of a duty to the country in bringing their ideas under the view of Government: That they had ventured, on this occasion, to deviate from the usual course of the Society, by applying for aid, in consequence of the deplorable situation in which the wool-growers of Scotland were now placed. While all other classes enjoyed, for the produce of their industry, a greater or less degree of protection, they were left to struggle with difficulties, which have destroyed a great proportion of the capital vested in stocking their lands. The Directors did not, however, wish to enter upon the question of protection by duty; but they could not refrain from expressing their hope, that the circumstance, that so important an article of British produce as wool was left without any protection from foreign competition, would be considered by his Majesty's Government as a good reason for their giving encouragement to any reasonable project for enabling that competition to be carried on with success.

The Directors regret to state, that this representation has not yet obtained that consideration from his Majesty's Government, which the interest and importance of the subject, and the reasonableness of the request, entitled them to expect. They have, however, had occasion to express their thanks to Mr Hope Johnstone, chairman of the committee, for the assiduous attention he has given to the duty entrusted

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to him, to the Earl of Haddington, and to others, who have exerted themselves to forward the wishes of the Society.

Representations have been made to the Society of the great injury that has been sustained by the shutting up, in the northern districts of Scotland, of the ancient Drove or Cattle-Ways, by the operation of turnpike-acts. The Directors, though fully aware of the injury that has resulted from this circumstance, have not felt that it was expedient for the Society to interfere. Where turnpike-acts have already been obtained, any attempt to re-open these ancient droveways would be altogether fruitless, and opposed, in every case, by the trustees of turnpike-roads, and the private parties, whose interests would be affected. All, therefore, that can be done, is to recommend, that where future road-bills are in progress, parties interested will endeavour to resist attempts to deprive the country of these important rights of way.

The Society has now had the satisfaction of seeing brought to a conclusion that interesting work, to which their attention has been so long devoted—the Dictionary of the Scoto-Gaelic Language. The Directors have had reason to be fully satisfied with the execution of this splendid work. They have directed copies of it to be presented to his Majesty, to whom it is dedicated, to several of the learned Societies of Europe, and to various distinguished individuals at home and abroad.

The Directors have had frequent occasion to report on the flourishing state of the Veterinary School, established under the auspices of the Society. The attendance of pupils has continued to increase; and, in addition to the ordinary course, Mr Dick has been encouraged to deliver a series of more popular lectures, which have been attended by many members of the Society, and other gentlemen residing in Edinburgh. An annual examination, under the superintendence of several

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eminent medical gentlemen, has been instituted; and it is proposed that certificates shall be given to those pupils who have attended a period of not less than two years, and proved themselves qualified to practise.

The Society has continued to direct increasing attention to the important subject of the Woodlands of the country. It has endeavoured to encourage the cultivation of the best seeds of the pine. The number of premiums, as regards improvements in planting, the introduction into use of new species, and the management of the nursery, have been increased; and the Society's gold medal* has been offered to all who shall have planted a space of 100 acres of ground within a period of five years, and who shall transmit, at the same time, a satisfactory account of the operation. On the same principle gold medals have been offered to all who shall, within a period specified, have reclaimed a given quantity of land from waste.

A considerable number of new premiums on various subjects have also been proposed, as will appear from the yearly lists published—such as the premium for the best essay on the construction of the Plough; the premium for raising Turnips, by means of Bone-Manure, a practice which has already made a surprising progress in the principal turnip-districts of the country; one for the successful introduction of any new species or variety of useful plant suited to the soil and climate; one for the best account of any district of Scotland, with the design chiefly of calling attention to improvements more recently effected, and to those of which the district seems yet susceptible; and some for information on various

* New designs for the gold and silver medals of the Society have been obtained, and dies executed, which are in the highest degree creditable to the artists employed.

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common diseases, to which sheep, and other live-stock, are subject. In offering this last series of premiums, the Society has had in view the obtaining of practical information from a class of individuals remarkable for their shrewdness and accurate habits of observation,—the shepherds of Scotland. In perusing some of the essays transmitted to the Society by this meritorious class, it is impossible not to be frequently struck by the general, and, in many cases, scientific, knowledge displayed, under circumstances apparently very unfavourable to its acquisition. Besides these, and other subjects, for which premiums have been offered, many of the old have been continued, amongst which it is only necessary to advert to those relating to the straw-plait manufacture, with the progress of which the Society has reason to be gratified. The material hitherto commonly employed has been rye, but seeds of the true *Grano Marzolano* have been procured from Tuscany, and will be made the subject of immediate experiment. As connected with the subject of seeds and plants, it may be mentioned, that Mr Lawson of Edinburgh has been appointed seedsman to the Society. Mr Lawson has already made progress in preparing a valuable herbarium of the gramineæ for the Society's Museum. He has devoted a portion of his nursery to the raising of specimens of the indigenous grasses, and he continues to afford every facility to gentlemen connected with the Society, of making experiments on such plants as they may wish to cultivate.

The improvement of live stock, the staple production of the country, has never ceased to occupy the anxious attention of the Society. The system of local Shows has received every encouragement; and, notwithstanding the multiplicity of details, is now reduced to great regularity. In the larger and more general shows of stock, the Society has found it expedient to deviate from the plan which it originally chalked out. The arrangement was, that the shows should

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be held triennially and alternately at Edinburgh and Glasgow, and in the intermediate years at some other town or city to be fixed on. The applications, however, have been so numerous and urgent for having shows in different parts of the country, that the Society has yielded to the wishes so generally expressed. It has been directed that the General Show shall be held this year at Perth, in the following year at Dumfries, in 1831 at Inverness; and an application, to which the most favourable attention has been paid, has been made for holding one in 1832 at Kelso. As connected with the Perthshire Show in the present year, it may be mentioned, that the Board of Ordnance has been so obliging as give the use of the extensive depot for prisoners of war at that city, for the purpose; and that large subscriptions, in aid of the Society's premiums, have been offered by the Magistrates of Perth, and various agricultural associations connected with the district.

A communication from the county of Aberdeen, regarding the inconvenience resulting from the practice of holding the great provincial markets throughout the country, on days partly under the new and partly under the old style of reckoning, led to the appointment of a committee, for the purpose of investigating the subject. A very lucid and satisfactory report, embracing a variety of details, has been drawn up, and transmitted to the convener of the county of Aberdeen. The committee do not seem to conceive, that the inconveniences complained of, result, in any material degree, from an intermixture of the new and old styles, but from other causes indicated in the report; and that the remedies for these evils, granting them to exist, can only be obtained by legislative interference. The committee expressed it as their opinion, that, in the progress of society, the great country fairs are naturally liable to fall into a state of decline, and, as intercourse becomes more frequent, that they give place to

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the regular and weekly markets of the towns. Such is the case in the most populous and best cultivated districts. In East-Lothian, fairs are now almost unknown, while the markets of the towns have usurped a consequence much beyond that of the districts less advanced. St Boswell's Fair, the regulating fair in Roxburghshire, is much on the decline. In Clydesdale, the profession of hucksters for the produce of the ground, makes it less necessary to have a concourse of the country people for the disposal of their commodities. In Forfarshire, one fair, Tarnty or Trinity Muir, regulates almost all the transactions of the country; and every town has its own weekly market. In Inverness-shire, on the contrary, there are more than twenty fairs held annually, and only one weekly market in the county: in the county of Caithness, likewise, twenty fairs, and one weekly market: in Argyllshire, eighteen fairs, and no weekly market. The committee, however, do not recommend that fairs, though frequently more injurious to the industry and morals of those who attend them, than useful to the business of the district, should be discontinued, when the object is the sale of horses, cattle, sheep, and similar produce; but they maintain, that those held for the sale of pedlary, and other articles, to be had better in shops, should be considered as nuisances, rather than otherwise, and as encouraging vagrants, and venders of inferior articles, and promoting idleness, dissipation and vice, in a great variety of forms. Fairs are now held on particular days of the week,—as on the first Tuesday of April, the last Thursday of March, &c. The committee do not seem to consider that it would be an improvement upon this system to resort to the days of the month. By such an arrangement we should be fixing a definite and immovable rotation for what in its nature is fluctuating and liable to change. Many fairs now celebrated may sink into insignificance, and those which were formerly subservient to them may become the leading meetings of their districts. It cannot be always

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equally desirable, that the relative order of holding the markets should be continued the same; and fully as much inconvenience might soon arise to the new system, from the operation of natural causes, as is now experienced from a supposed want of system in the present arrangement. The interference with the vested rights of corporations and individuals, would probably present so many obstacles, as to make the difficulties of attempting a new regulation almost insurmountable, which, after all, might leave disadvantages not disproportionate to those already complained of. The evils, indeed, of the present system, seem to be rather overrated. They are not continuous, but only of periodical occurrence, and may be foreseen and guarded against for future occasions, if consequences very pernicious have resulted from them heretofore. It cannot be well understood, for example, why those having interest in the custom of the Dumfries and Lockerby markets (the two markets quoted as having materially interfered with each other in a certain year), should not naturally apply to the proper source for rectifying their relative situations, without the necessity of all the fairs of the country being put upon a *roster*, which, in all probability, would speedily be discovered to be perfect only in idea, for the time, and certain not to continue so, but to become imperfect and unsuitable, in proportion as the progress of society, and the circumstances of the country, operated by natural causes to put the artificial arrangement out of order.

On the whole, the Committee express their doubts of the expediency of a change being recommended from any quarter, but state it as their confident opinion, that it ought not to originate with the Highland Society. It is quite plain that nothing could be attempted with any prospect of doing good, but through the medium of a legislative enactment; and, if recourse is to be had to parliamentary interference, it would be idle even to open up the subject further, by collecting information at present, with means so comparatively

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ineffective, as would, of course, be resorted to, if the subject were thought worthy of investigation by the state.

The Society has had frequent occasion to advert to the inefficiency and injurious consequences of several of the provisions of the act of the 5th Geo. IV., for establishing uniformity of weights and measures. Besides having brought the subject under the review of Government, the Society has endeavoured to call the attention of Scottish members of Parliament to the present unsatisfactory state of the law, as it affects this part of the island; and a confident expectation is now entertained, that another session of Parliament will not be suffered to elapse before the act shall have undergone an entire revision.

A committee has been recently engaged in the preparation of a series of designs of Farm-Buildings, suited to the ordinary farms of the country, which it is hoped will soon be ready for circulation. The Society has to acknowledge many valuable works, drawings, and models of useful machinery, which have been transmitted to it; and it continues to keep up the most friendly intercourse with similar institutions in different parts of the country.

HIGHLAND SOCIETY HALL,
Edinburgh, October 2. 1829.

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[In 1826, a Premium was offered by the Society "For the best and approved Essay on the State of the Highlands and Islands of Scotland, Agricultural, Manufacturing and Commercial; the progress and influence of the changes at present affecting their condition, and the means of deriving from these changes, for the benefit of the population at large, the greatest portion of good, and rendering such as have an unfavourable tendency productive of the least possible degree of evil." Several Essays were received, and a premium was awarded for the one which follows. The Directors have accordingly ordered it to be published in the present volume of the Transactions. It is scarcely necessary to observe, that, in this, as in other cases, the Society is not responsible for the individual opinions of the writer.]

ESSAY ON THE PRESENT STATE OF THE HIGHLANDS AND ISLANDS OF SCOTLAND. *By* JOHN ANDERSON, *Esq.* W. S., F. S. A. Scot., & M. N. I.

The present condition of the Highlanders of Scotland is that of a people passing from the influence of feudal principles to that of constitutional liberty. Legislative enactments have severed the bond which linked the vassal to his lord, but have not effected the entire abolition of habits acquired during centuries of degradation. Yet it is only by eradicating every trace of feudal dependence, that the sense of individual importance which can fit him to be the associate of freemen, can be imparted to the emancipated serf. The advocates of clanship, while they claim for it the merit of inspiring elevation of character, admit that it was unfriendly to labour. While we willingly receive this admission, we are

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far from giving assent to the former proposition. A sense of personal independence was unknown, the government was a hereditary despotism, and the great mass of the people, so far from acting with freedom, could scarcely be said to have a will of their own. It is not our intention, however, to discuss the nature and effects of feudalism, or to exhibit the hereditary animosities of rival clans. The system has been broken up, as incompatible with the progress of civilization, and we have now to direct our attention to the population of our Highland districts, freed from the fetters of the patriarchal government, but not yet fully incorporated with the existing order of things.

Looking at the map of Scotland, let it be supposed that we start from the town of Dunbarton, and journeying along the eastern slope of the Grampians, cross that mountain range to the pass of Ballater, and from thence proceed by Inverury to Keith and Fort George, leaving to the right the lower districts of the counties of Aberdeen, Banff, Moray, and Nairn. Crossing the Moray Firth, let us make the circuit of Sutherland and Ross, and, returning southwards, skirt the western shores of the Outer Hebrides, to the Mull of Kintyre; whence proceeding up the Frith of Clyde, we should arrive at our starting place. Within this circuit is included the district to which our observation is to be directed.

This district itself may be divided into four subordinate portions, constituting the northern, the western, the central, and the insular districts. In the first may be included the shires of Sutherland, Cromarty, Ross, and part of Inverness. The western will comprise a great part of the county of Inverness, the whole of Argyll, and part of Dunbarton. The counties of Perth and Stirling form the central portion. The islands, again, may be considered as constituting a district by themselves.

The features of the northern division are, in general, of a rugged and mountainous character. Towards their western

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confines, the uplands of the counties of Ross and Inverness present scenes of the rudest kind; and the admirer of nature cannot fail to be highly gratified with the bold and magnificent landscapes afforded by the range of mountains which extends from Lochbroom and Kintail to Lochaber. Amidst these tracts, in the windings of Glenstrathfarrar, the vales of Urquhart, and other secluded valleys, many a lovely spot remains unknown to the tourist. Easter Ross is a beautiful and highly cultivated district, and the country around Inverness, the capital of the Highlands, may vie, in fertility and diversity of scenery, with the most favoured parts of the south. Argyllshire, for the greater part, is also mountainous. Dunbartonshire, again, is charmingly varied by heights of alpine grandeur and fertile valleys; while the extensive bounds of Perthshire display a combination and contrast of mountains, rocks, forests, straths, and glens, not less attractive. The scenery of Stirlingshire, with its cloud-topped hills, its romantic lakes, and fertile plains, is not inferior to that of the other counties.

The climate of the Highland districts varies, as they incline to the western or eastern shores. The Atlantic, which bounds Scotland to the west, and is subjected to little variation of temperature, is proved to have a predominating influence, being five degrees colder than the German Ocean in summer, and three degrees warmer in winter *. The westerly winds which sweep over its wide expanse, carry with them vast quantities of vapour, which, attracted by the lofty promontories and ridges of the western coasts, bursts in torrents upon the glens. Nor is the distinction between the western and eastern coasts more remarkable in climate than in soil. While the former is damp and boisterous, the latter is generally thin, on the western coasts; whereas the eastern boundaries of Inverness and Ross are comparatively dry, and furnished with excellent soil †.

* Thomson's Chemistry, vol. iii. p. 315.

† Sinclair's Agricultural Report of Scotland, vol. i. p. 50.; Stat. Account, vol. ix. p. 64, vol. iii. p. 22 480.

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But the mists which rise from the German Ocean, accompanied by cold easterly winds, produce various maladies, hardly known in the west, where the climate is on the whole mild and salubrious, and the snow lies but a short time on the ground *. The inland districts of the counties of Banff, Aberdeen, and Perth, are perhaps equally liable to excessive rains as the coast districts, and the temperature is there generally lower in the winter months.

By the general census made in 1821, of the whole Highlands and Islands of Scotland, the counties of Argyll, Inverness, Nairn, Ross, Cromarty, Sutherland, Caithness, Orkney, and Shetland, and the Gaelic districts of Perth and Moray, comprehending 171 parishes, contained 416,852 persons, forming 78,609 families. Of this mass the number living in towns of above 1000 inhabitants, does not make one-tenth of the whole; and it is chiefly on the eastern coasts that these towns occur †. The extensive shires of Inverness and Argyll comprehend nearly one-fifth part of the whole surface of Scotland, yet they contain only one-eleventh part of its population ‡. The proportion of land in cultivation in the former county is supposed to amount to only eight parts in the hundred, the remainder consisting of pasture and heath; and the general proportion in the latter county is estimated at 100,000 Scots acres under the plough, and 30,000 of woodland §. In Ross, the proportion of cultivated land, notwithstanding the great fertility of East Ross, is supposed to be only about one-eleventh of the whole; and, in Cromarty, about one-eighth.

A striking and important fact in the history of the Highlands is presented by the progress of population, an increase

* Appendix to General Report of Scotland, vol. i. p. 124.

† Report of the Inverness Society for educating the Highland poor, 1826, p. 21.

‡ General Report on the State of Scotland, vol. i. p. 32.

§ Appendix to General Report of Scotland, vol. i. p. 49.

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of 100,000 having taken place in less than a century *. To be satisfied of this, we have only to consult the tables published by the Inverness Society for educating the poor in the Highlands, where the progressive difference between Dr Webster's enumeration in 1755, Sir John Sinclair's in 1791, and the Government census in 1821, is methodically shewn. From these tables, it appears that the total increase of population of the Highlands and Islands (including Orkney and Zetland) from 1755 to 1821, has been 118,213. Three-fourths of the population speak the Gaelic language, the number of persons understanding English better than Gaelic being 133,699, that of persons more proficient in Gaelic, 303,153.

The only means of religious instruction for this population, including forty new appointments by Government, are provided by 264 parish ministers and missionaries of the establishment, six Episcopal clergymen, and twenty-nine of other persuasions †. There are about six or eight Roman Catholic priests within the Highland limits, chiefly in the counties of Inverness and Argyll. About 12,000 persons in the districts of Lismore in Argyll, Kilmanivaig and Kilmorack, and the Isles of South Uist and Barra, in Inverness-shire, profess the Roman Catholic faith; and at Lismore, there is a college presided over by a bishop, where those destined for the priesthood receive an initiatory education.

The number of schools is as follows:—

Parochial Schools,	171
Schools established by the Society for Propagating Christian Knowledge,	134
Schools established by the Gaelic School Society of Edinburgh,	77
Schools established by the Glasgow Society,	48
Schools established by the Inverness Society,	65
Total,	495

* Prize Essay on the Highlands, published by the Northern Institution, p. 109.

† Moral Statistics, by Inverness Education Society, p. 73.

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According to a statement lately sent to the Scottish Sabbath School Society, the number of scholars attending 67 Sabbath schools in Inverness is 810. Besides, there are in the country parts of the parish several schools of the same description numerously attended.

In 1818, the Inverness Society for the Education of the Highland poor was established. Its objects, and the result of its labours, were laid before the public in 1826, under the title of "Moral Statistics of the Highlands and Islands of Scotland." Much has been said of the necessity of missions to the heathens, and vast sums have been expended for this purpose; but it were well to reflect upon the condition of our own population, and consider whether the wealth dispersed in other channels might not be as profitably expended in the Highlands, where the *whole* Bible was unknown in the Gaelic tongue till 1802, where half of the population are unable to read, and where upwards of one-third of the whole population are more than two miles, and many thousands more than five miles distant from the nearest schools; where, in the western parts of Inverness-shire and Ross-shire, all the copies of the scriptures found existing, are in the proportion of one for every eight persons above the age of eight years, and in other parts, including Orkney and Shetland, one for every eight persons; where one-fourth of all the families, or 100,000 persons, are still wholly without Bibles; while in this number there are several thousand families in which there are persons who can read the scriptures.*

Every one who has visited the Highlands must have been struck with the deplorable absence of towns. From the Mull of Kintyre to Inverness, there is but one, and that of very small extent, Inverary; Oban, Fort-William, and Fort-Augustus meriting no other appellation than that of villages. The only collection of houses that occurs on the great

* Moral Statistics, page 27.

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military road from Dunkeld to Inverness is the dirty and miserable village of Kingussie. In the whole western districts of the counties of Ross and Inverness, there is not a single town, and hardly a village deserving the name; and in the islands, we find only the solitary village of Stornoway. All the sources of instruction and means of mental improvement are confined to the eastern shores, where, if we include Sutherland, the towns are seven in number; Dornoch, Thurso, Tain, Dingwall, Fortrose, Cromarty, and Inverness. Excepting in these parts, there is hardly a single circulating library or book-shop; and Inverness contains the only printing presses, and is the only place whence newspapers are issued in the Highlands.

A people can hardly be made susceptible of instruction in any department of knowledge, until they are rendered sensible of their need of it; and it is necessary to exhibit the general condition of the inhabitants of the Highlands before we can enlarge on their agricultural and commercial relations.

Strictly speaking, my observations are intended to point more particularly to the situation of the *real* Highland districts of the counties of Argyll, Inverness and Ross; for with the exception of some of the more remote parts of Perthshire and Aberdeenshire, the natives of the other districts are daily losing the characteristic features by which they were formerly distinguished from the neighbouring Lowlanders, and are yielding to the influence of those sentiments and customs insensibly adopted by the nation at large. The pressure of high rents has already done away, in a great measure, with the hereditary notions of obedience and devotedness to the chief, on the part of the dependent, in Argyllshire; but in the secluded parts of the counties of Ross and Inverness, we may yet see the interesting spectacle of a people preserving the habits of former times, and affected by the relations of feudal and patriarchal attachment. That these feelings are at all cherished, repeated reflection has led me to conclude to

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be owing, in no slight degree, to the countenance of individuals of the last generation. Many of the gentlemen of that period, before going abroad for the bettering of their fortune, had naturally imbibed an attachment to the principles which were then prevalent, so as to render it extremely difficult for them, in after life, even with all the advantage of travel, to shake it off. When they returned to their native land, finding new opinions hostile to every cherished association expressed around them, and led by perhaps an amiable weakness which inclines us to venerate what has had the authority of our fathers, the representatives or cadets of ancient families took a pride in exacting from their dependents the hereditary homage which eighty years of freedom have scarcely yet taught them to refuse. There are other persons also, who, having passed their lives as the humble friends of some ancient aristocratic house, or as the general superintendant of its affairs, have never had the benefit of mixing with the world, or of conversing with it through books. Limited in the range of their knowledge, and having an aversion to learn any thing new, they consider profound respect and obedience to rank as a sacred duty. Reform is to them another word for treason, and difference from existing powers the province of a democrat.

To select as an example of the lethargy of the native Highlanders, I would turn to Inverness, and ask if the majority of the improvements effected in that town and the county of which it is the head, within the last twenty years, have not been planned or carried on by those who were not denizens by birth? There have, no doubt, been great ameliorations produced there since 1765, and a casual spectator might perceive very little difference between the capital of the Highlands and a Lowland or English town of similar size. But the acute observer cannot fail to remark the almost total absence of all commercial spirit and enterprize, the dull appearance of the harbour, and the filth of the streets.

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The decline of the commercial prosperity of Inverness has, in a great measure, been attributed to the political events consequent on the last rebellion. It is well known that, till the revolution of 1688, Scotland had no commerce worthy of the name. In the wretched times of her independence, whatever trade existed was monopolized by designing monks, who continued to secure to themselves all the gain that could be made of the few foreigners who sought their coasts *. A despicable selfishness characterized every town and every community; and the fact that the building of one solitary vessel at Inverness, in 1249, by the Count de St Pol, should form a subject for history, is of itself decisive evidence of the poverty and ignorance of the people. Till the termination of the rebellion, in 1746, Inverness profited largely by this policy. Besides the export of malt and oatmeal, she enjoyed an exclusive commerce in skins with the north of Europe, in which adventure not a few of the younger sons of gentlemen of quality engaged with success. The imports from foreign parts to Inverness were chiefly spirits, French wines, tobacco, tar, and some wood. But when more enlarged views were disseminated, on the overthrow of the clan system, the Highlanders of the western coasts discovered that they had marts in Greenock and Glasgow every way as fit for the disposal of their merchandise as Inverness, and more convenient from their proximity. These new channels drew off the supplies which formerly flowed into one reservoir. The causes no longer operating which at one time rendered Inverness the great depot of Highland produce, her intercourse with foreign parts has necessarily diminished, and her home connexions have been greatly modified by the packets established between London and Leith, and the various sta-

* Scotland indeed swarmed with clergy, and not less than a third of the kingdom belonged to them. Every thing was tithed by them: not even the tenth egg escaped from their clutches. See Fragment of Scottish History, page 28.

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tions of Wick, Thurso, Brora, &c. It would appear that her citizens since then, have either not possessed the means, or the inclination, to avail themselves of the capabilities of her geographical position; as, except five smacks in the London trade, Inverness possesses few vessels of any other description. Not to digress further on a topic, which it may be necessary to enlarge upon in the sequel, it may be noticed, that Inverness possesses a free press, and various literary, professional, and philanthropic institutions. A taste for literature and science has undoubtedly taken root, especially among the rising generation, though not without a struggle.

The alarm excited by the rebellions of 1715 and 1745 demonstrated the necessity of overturning a policy, by which an inconsiderable part of the island was enabled to counteract the measures of government. The first step which ministers had recourse to, was the opening up of roads, and troops were accordingly set to work on three great lines traversing the country from Stirling to Fort-William,—from Fort-William to Inverness,—and from Inverness to Dunkeld. Minor branches sprung from the leading ones; and the views of the legislature have since then been indefatigably directed, not only to the support of the old roads, but to the formation of new ones, under the direction of commissioners appointed for that purpose. The usual annual sum paid to contractors and other workmen employed by these gentlemen, who have done so much honour to themselves, and to the liberal spirit of the government, is about L. 8,200; the expense of management and inspection about L. 1,800; in all about L. 10,000 per annum, for which 1,200 miles of road, with bridges unusually numerous, are maintained in good repair *. Of this sum, the Highland counties are called upon to contribute about L. 6,000 annually. This burden, some of them, since 1823, alleviate

* See the 14th Report of the Commissioners, ordered to be printed, 27th March 1828, page 1.

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by means of tolls, by virtue of an act of Parliament then procured by the commissioners. The placing of these on many of the leading roads in Ross, Perth, and Inverness, manifests the beneficial change in the prosperity of these counties. In Ross-shire there are three toll-bars, let at a rent, till 1st August 1828, of L. 386. Inverness-shire contains seven bars, and the amount produced from them up to 31st December 1827, was L. 249 : 7 : 11. Many of the proprietors are hostile, however, to any further imposition of tolls, as the roads on which they could be placed traverse thinly inhabited and uncultivated districts.

Two canals were projected and executed, the Crinan and the Caledonian. The herring fishery was encouraged; and various patriotic societies directed their attention to the condition of their countrymen. Individuals and associated bodies in several districts of the Highlands, emulating the praiseworthy spirit of these public institutions, lent their aid to the introduction of various branches of industry and manufactures, —the improvement of agriculture,—and the dissemination of instruction. As the rallying point through which the communication with the northern and southern provinces of the kingdom is kept up, Inverness has derived, and must continue to derive, more enlarged views of policy than any other quarter; and the fruits of this intercourse are manifested in the public spirit which has gradually arisen since 1765. Seven public coaches, established within the last twenty years, now arrive at, and daily depart from, Inverness. Steam-boats ply regularly every week from thence to Glasgow; and one sails, during the summer season, from Glasgow for Islay, Staffa, Iona, and Skye. Occasional visits are also made by steam-boats from Leith to Inverness*. The number of private dwellings during the last few years has certainly been on the increase in the town and vicinity; and a visible amelioration in

* During the present year, 1829, a steam-boat has regularly plied between Leith and Inverness.—EDIT.

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the dress of the inhabitants is also discernible. The hotels may vie with any in the kingdom; and in many elegant shops all the luxuries of the table or toilet are to be procured. There are four branches of different banks, and two weekly newspapers, a literary and scientific institution, an academy, a grammar school, reading rooms, billiard table, and subscription library; an infirmary, and handsome accommodation for the festivities of the Northern Meeting, whose members have lately succeeded in establishing races, with stakes of some magnitude. Races were in use, however, in Inverness as far back as 1662, and were then "an ancient custom;" but I leave it to better political economists to point out the probable effects of the union of Newmarket with the wilds of Dunsinane! A company has lately been formed for the introduction of gas and water into the town; and a sum of about L.7000 has already been expended on the necessary works. Prior to 1815, the provision for the poor of the town and parish (containing about 12,000 inhabitants), consisted of collections at the church doors, the rents of certain houses and lands, and the produce of sums laid out on bonds, all under the management and administration of the Kirk-Session *, and the interest of certain mortifications and bequests under the charge of the Magistrates and other public bodies. The annual produce of the Kirk-session funds amounts to L.367. In the year 1815, an association was formed under the name of the "Inverness Society for the Suppression of Begging." Pauperism has, it is said, increased considerably, notwithstanding, since 1815; and there are at present nearly 200 paupers on the list of the Kirk-session, receiving aid from their funds, some of whom are also pensioners of this society.

The completion of the Caledonian Canal was looked to with anxiety, not only as a source of future national wealth, but as a powerful check, during its progress, to emigration,

* Inverness Courier, 23d April 1828.

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and a means of imparting industry to the population. The latter of these hopes, it is apprehended, has proved very illusory. With respect to the prosperity of the canal itself, time alone can decide: "Although deeper *," say the commissioners, "than other canals at present, it cannot be expected to justify the expectations which recommended it to be executed as a great national work, until it attains the full depth of twenty feet throughout; the expense of effecting which was carefully estimated in February last, at L. 41,000, most part of which would be expended in clearing away obstructions on the summit level." It was commenced in 1806; the total expenditure attending it from that period till 1st May 1827, has been L. 973,271 : 2 : 4½. Of this enormous sum, only L. 27,951 has been paid for the "purchase of land and damage;" whilst "labour (measure work) has cost L. 418,101," "Labour (day work) L. 47,202;"—"Quarries and masonry, L. 199,528, 17s;"—"Machinery, L. 128,084 : 19 : 9."

From the official reports, it appears that a falling off in the tonnage rates has taken place between the years 1826 and 1827. The amount collected during the year ending 1st May 1826, was L. 3,207; during the year ending 1st May 1827, but L. 2,445. "This result (say the commissioners in their twenty-third report) tends to discourage any further increase of tonnage rate, whatever allowance may be made for depression of commerce since November 1825, many shipmasters having been known to recur to the circuitous passage of the Pentland Frith, rather than pay 2s. 7d. per ton for passing through the canal; although the saving of time, and consequently of expense (setting aside the danger) would seem to be more than an equivalent. These tonnage rates have been altered from time to time. When the canal was opened from sea to sea in October 1822, a rate of one farthing per ton per mile was established; at the beginning of

* See the twenty-third Report of the Commissioners, 23d May 1827.

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July 1825 the same was increased to one halfpenny per ton per mile; but the income not being sufficient to meet the expenditure (stated at L. 4,100), it became necessary to apply to the Lords of the Treasury for authority to *borrow* any sum which might be necessary. In consequence of their Lordships' suggestions, the old tonnage rate of one farthing per ton per mile was again adopted *. Still the produce for the last twelvemonth, as compared with the expenditure, leaves a deficiency of L. 1,300! a sufficiently discouraging statement; but, to use the words of the commissioners, "it is not new in the history of canals, that they came slowly into use, of which the Forth and Clyde Canal, now a very profitable concern, is a well known instance."

But the exertions of a rising people are not confined to Inverness-shire. The neighbouring county of Ross, in its improved system of agriculture, and many other particulars, has shewn that its heritors keep pace with the times. In the town of Dingwall, to which the bailies of Inverness thought proper, less than a century ago, as appears by their records, to send ambassadors as to a *terra incognita*, a taste for literature has arisen. A town which, by the report of these worthies, "was much oppressed by their lairds," described in 1724, as "turned desolate *," where nothing was to be seen "but the ruins of old houses," now affords, by the following picture, a pleasing contrast, though its streets are none of the cleanest, nor "the old houses" quite removed. "About a year ago †, a Subscription Library was established in Dingwall for the accommodation of that burgh, and of the neighbouring parishes in the district of Wester Ross. Liberal donations were afforded by Mr Stewart Mackenzie of Seaforth, Mr Davidson of Tulloch, Sir F. A. Mackenzie of Gairloch, Mr Mackenzie of Kilcoy, and other gentlemen, who thus ma-

* See the twenty-fourth Report of the Commissioners.

† Prize Essay, published by Northern Institution, p. 95.

‡ Inverness Courier, 25th July 1827.

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nifested their zeal in the promotion of knowledge. The Library already consists of about 400 volumes of well selected works in history, science, and literature." At Tain, still further north, a respectable bookseller's shop has been a considerable time established; and in place of the whole north of Scotland being supplied with the few sheets of writing paper occasionally called for by the postmaster of Inverness, it has been stated in the British House of Commons by an eminent member, that, in an obscure shop at Inverness, he found a scientific work which he had in vain sought for in Oxford!

These instances may perhaps suffice, in illustration of the triumph of civilization over feudalism: A few short years, and the latter will exist but as a dream! Like the rude Indian retreating before the advancing bands of white men, the manners of our forefathers will only be found in the remotest nooks and corners; and, in process of time, their professors will diminish in number, till they gradually disappear.

Yet, with every tendency to amelioration, it is a melancholy truth, that emigration from the Highlands has assumed an alarming aspect. I speak not of those numbers who quitted their native land after the first introduction of the sheep system: I confine myself to the present day. In the month of July 1827, a vessel sailed from Leith for Tobermory *, destined, with two other ships, which were proceeding from Newcastle, to take out 700 emigrants from that district to the island of Cape Breton. In 1826, three vessels left Tobermory with above 600 passengers for the same destination; and there are now, it is understood, more than 1000 individuals preparing to follow their relations to their Transatlantic settlement.

To what causes are we to ascribe this voluntary expatriation? Can it be that our population is unable to procure the means of subsistence from agricultural labour, and that the

* Edinburgh Observer, 31st July, 1827.

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rents laid upon them are too heavy? The subject deserves investigation, and we shall discuss it in a subsequent part of our essay. For the present, we content ourselves with denying that it is by rural avocations alone that the Highlander is to be supported. To what purpose has Providence supplied our coasts with vast shoals of the finest fish, if the indolence of man prevents his availing himself of the boon? We see our waters robbed of their wealth by foreigners, and yet we stand listless spectators. Admirers, detractors, all agree in telling this to our Highlanders, and yet, what have they effected by so doing? It is very true that some spirit has of late years been roused in the prosecution of the herring-fishery of Caithness; but will any one say that the capabilities of the country have been fully tried? I am aware that the Highlanders, generally speaking, have an antipathy to the sea, as they have to manufactures. They have been so often told by inconsiderate economists, that they are unfitted, by the *romance* of their character, for the labours of the shuttle, the hammer, or the plane, as to be flattered into the belief of the assertion. But do these writers reflect, that their ill-timed remark has the very effect of encouraging that spirit of indolence, and that reluctance to labour, invariably manifested by a rude people, but recently reclaimed from feats of arms? That the Highlanders are capable of great occasional energy, I admit. This, nevertheless, is but a momentary excitement, not a principle of continued activity. To what other cause, but a false pride, can be referred that unwillingness of the Highland peasant, to engage in manufactures? Yet, take him out of his hills, and place him at a loom in Glasgow or Paisley, and he becomes a tractable and industrious workman. Man is a being of habit, and only requires training to accomplish a change in him. Fifty years ago, the cotton trade had not found its way from England to the Lowlands. Why, then, should not those philanthropists be credited *, who contem-

* Brown's Strictures on the Highlands, 1806, p. 77.

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plate, not only the possibility, but the certainty, of the introduction of manufactures into the Highlands? The arguments which have been advanced against the scheme, are, want of regular and speedy conveyance for goods, want of skill and habits of industry in the people; and, if successful, a certainty that the adventurer would be followed by others, who would raise the price of labour by competition *. The first of these objections can now no longer be maintained, it would be thought, since the difficulties started no longer exist. Time would overcome any deficiency of skill or industry; and were the last remark tenable, in what condition would we, as a manufacturing and commercial people, be, if it were given weight to, in our manufacturing districts, which exist by rivalry? That there is an apathy to industry in the character of the common Highlander, cannot be denied. This, no doubt, is referable to many causes: not the least of which is the rude state in which he exists, and which, from the mass of the people being either in a great measure idle altogether, or of no correctly defined calling, leads them to rely, in too many instances, on their landlords, to preserve them from actual starvation †. The most amusing cause which has been assigned for this indolence, is the *ease* with which a man in these regions acquires subsistence ‡. A goodly display of fish, milk, eggs, potatoes, poultry and pigs, is very temptingly served up by the imagination of the writer. But where are these, if the peasant is not a crofter or farmer; and where, if (as often happens) the son of this crofter, and his wife and family, are living on the charity of the parent, shall they seek these comforts? Indeed, I believe it would puzzle many a man, even those who are intimate with the condition and habits of the Highland peasantry, to say in

* Lord Selkirk's Observations on Emigration, 106.

† In 1812, Clanranald expended L. 3,353, 7s. in purchasing meal for his poor people; in 1815, L. 1,111 : 11 : 3; in 1816, L. 242 : 8 : 3; in 1817, L. 4,565 : 18 : 5; in 1818, L. 1,136 : 19 : 6.—*See Third Report of House of Commons on Emigration.*

‡ Brown's Remarks on Lord Selkirk's Observations, 105.

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what manner a great proportion of them subsist. Milk and oatmeal are the staple commodities doubtless, and to these we may add the potato. This latter, combined with a small portion of oatmeal, is the common food of the population in most of the Highland counties. When this valuable root fails, however, from mildew or frost, the unhappy natives are reduced to the extremities of want. In the existing subdivision of land, there are limits, too, to its production. The luxury of butcher-meat is so rare as not to deserve classification in this place*. Pork is disliked by the lower class; though, on the eastern coasts, the scruple—partly a religious prejudice—is wearing away. Of fish there can be no want; the numerous creeks and bays on the coast, and the lakes, rivers and streams in the interior, abound with stores of various kinds. But indolence, and an indifference to futurity, often occasion distress of the most lamentable kind.

The aversion of the Highlander to the sea is well known. The handful of men who guide a few herring busses, on the west coast, is no exception; for their crews are a motley and ill arranged groupe of landsmen and coopers, with very few

* In all the islands, and along the northern and western coasts, a very large proportion of their food is derived by the natives from the shores. In the Outer Hebrides, from Whitsunday to the beginning of September, when the potato crop becomes available, the people live almost exclusively upon shell-fish of various kinds, together with sand-eels and occasionally sea-weeds. Of the shell-fish, those on which they chiefly depend are limpets and cockles, of the shells of which there is always an enormous heap at the door of every hut. Crabs, lobsters, welks, spoutfish, some small fishes, in short, whatever is eatable, are added to this scanty, although not unsavoury, stock. Should a fish be found upon the shore, mangled by gulls, or even in an incipient stage of putrefaction, it is joyfully seized upon. In short, with the Hebridians, to use a proverb of continual application among them, "every thing that goes in the bag is fish." At a moderate estimate, one-sixth of their food consists of these miserable scrapings; and were the industry employed in procuring them applied to some species of manufacture, or to regular fishing, there is no doubt that they might be comparatively comfortable.—Ed.

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real seamen; and the expectations so fondly anticipated, that the Hebrides would become a nursery of hardy and skilful navigators, have never been realized.

To conquer the prejudices of a people so attached to old customs as the Highlanders are, the influence of their superiors would do much. It was probably from a feeling of this nature that the late Duke of Argyll instituted, and placed under the management of the Highland Society of Scotland, in 1805, a fund of L. 1000, the produce of which, with such further subscriptions and additions as should be made, was to be applied for the purpose of assisting in the education and maintenance of younger sons of Highland gentlemen of small property, intended for officers in the navy, to which service his Grace wished to direct a portion of the young gentlemen of the Highlands. Were the patriotic idea of the noble founder followed up, there is little doubt that a naval academy might be established with great advantage to the pupils, and to the population, in point of example, on the sea coast of Argyll, or Inverness. The interests of the naval service and of commerce might be made to go hand in hand. Such of the landholders whose bays afford anchorage, would find it their interest to encourage traders to visit them. The Herring Fishery Board are now, I believe, engaged in laying out a grant from Parliament, of L. 3000 per annum, towards the improvement of these natural harbours. Mr Macleod of Cadboll, who is proprietor of the village of Invergordon, in the centre of a rich and populous district in the Cromarty Firth, has, at his own expense, constructed a harbour there, having sixteen feet of water at spring-tides, and thirteen at neap. Mr Fraser of Lovat has also erected a commodious pier, at the village of Beauly, on the Murray Firth; and the beneficial effects of these works on the commercial interests of the country at large are already appreciated. And, whilst alluding to these minor sheltering places, it is impossible to shut our eyes to the short-sighted policy which has so long deprived the north

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of Scotland of an admirable mart of commerce with the northern states of Europe, in the town of Cromarty. Possessing a secure harbour, capacious enough to hold the entire navy of Great Britain, the town of Cromarty merits the attention of government, as a rendezvous for our cruisers in the time of war; one where they might provision and refit, and to which they might dispatch their prizes.

The most important effect to the Highlands of the revolution which succeeded the events of 1746, were the rise in rents, and the introduction of the sheep system. Till that period, the value of property was estimated, not by its returns in money or grain, but by the number of men who could be brought from each estate into the field *. When the feudal bond of union was dissolved, these retainers became supernumeraries, burdensome to the landlord; and in the struggle to rid themselves either of their presence, or to make them conform to habits of industry, it was naturally to be expected that emigration on the part of the people would be the consequence. That the country has in many situations benefited by the expedient, there can be little doubt. So long as the people are content to remain in idleness and poverty, partial emigration must continue, because the country cannot provide for their support. It would be impossible to countenance the idea, so often and so inconsiderately urged, that the continuance of a surplus population could be allowed, as in former days. If *one-half*, at all events one-third, of the community †, are without employment, they are necessarily a burden on the rest. What would form a surplus produce for these, is thus diverted to other channels; and the system goes on, till famine compels a fresh migration, and gives a partial relief. So soon, however, as the Highlands shall have received the advantages of which they are capable,—when

* Lord Selkirk's Observations on Emigration, p. 13. Robertson's View of Agriculture of Inverness, p. 328.

† Third Report on Emigration.

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fresh calls to industry, and a division of labour, have diffused the means of comfort, and the anxiety of mere subsistence is relieved, all necessity for emigration will cease. It is true that the mountainous parts have never been very populous *, the great mass of the population being accumulated on the sea shores, or on the numerous bays and lochs which intersect the country. Nevertheless, the population is frequently redundant, because the necessaries of life are not at their command. From the want of means to purchase the most ordinary implements of husbandry, or household-furniture, the peasant becomes his own carpenter, mason, saddler, shoemaker, and the like. The *caschrom* is manufactured by himself. It is used in fields, which could be more profitably ploughed with oxen or horses, since the culture of these, by this instrument, has been found three times more expensive. And who that has once seen a row of Highland peat-carts coming to market, can forget the shapeless form of the wooden wheels, the bridles fabricated of twisted birch, or the preposterous crupper of the same material, cruelly wounding the diminutive horses.

The introduction of the sheep system occasioned great clamour, and much animadversion, from the admirers of feudal days. But by surrendering the mountainous tracts to sheep and cattle, they were turned to the most profitable purpose for which they seem intended. And whilst, by this system,—the enlargement of farms, and the gradual rise of a superior class of farmers,—the Highland proprietor has added to his rent-roll, the population of the country itself, in place of diminishing, has increased. This is the best answer to the admirers of feudalism for its overthrow. A rise in rents, when conducted on fair principles, is a benefit to the tenant himself, by spurring him on to greater activity than he would have shewn were his burden lighter; whilst this increased energy of necessity brings along with it the means of adding to his own

* Strictures and Remarks, by R. Brown, Esq. p. 18.

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comforts. Greater wealth being, in this way, disseminated, the country is brought to contribute more efficiently to the general weal of the state. The reforms which, of late years, have been extended to the condition of the peasantry, seem, on a dispassionate attention to the details, to have sprung from the most enlightened policy, and to have been effected by the most humane means. I make here no hasty assertion. I have come to this result, after a correspondence with those whose local knowledge, and personal character, entitle their opinion to every weight. In one important instance, the people have been removed from the pastoral districts, and placed on the sea-shores,—introduced to greater domestic comforts—to wholesome food, to well built cottages, and excited by the stimulant of adequate recompense, to habits of industry. And what have they left behind? Starvation, black, smoky, mud-bothies, and the irregular pleasures of the chace, or illicit distillation.

Till 1809, Sutherland and Caithness were nearly destitute of roads. Now that these have laid open the country, the exports from the barren districts amount annually to 30,000 fleeces of wool, and 20,000 Cheviot sheep; and, from the sea-coast, several cargoes of grain, the produce of three considerable distilleries of Highland whisky, many droves of cattle, and from 30,000 to 40,000 barrels of herring, besides cod and ling *.

As is now well known, the condition of agricultural occupancy in the Highlands, in ancient times, was this: The gentlemen of the clan formed an intermediate link between the chief and the people. Under the name of tacksmen, or wadsetters, they held the land from their superior, while they again gave out the same in portions to the lower ranks, under fealty to themselves, with the obligation often of grievous services totally distinct from the rent. Where the

* Letter quoted in Fourteenth Report of Commissioners for Highland Roads and Bridges, p. 61.

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condition of the tenantry was such as not to admit of individual selection, "a township," or association of families, would engage for the farm by *runrig*, each individual having but a temporary interest in his lot, and being also bound for the rent of all his fellows.

To this method of labour succeeded the crofting system. By it a division of the joint farms was effected, with the creation of new ones. The partner of a wretched lot became the sole cultivator of his own; but it is not to be supposed that townships or joint farms are exploded. They still subsist in many districts, but must give way as more enlightened systems prove their superior advantages, both for landlord and tenant. The subdivisions of the old holdings, and the diminutive scale of the possessions, with the practice of tilling only the *infield*, and neglecting the outskirts, necessarily entailed misery, with imperfect and scanty crops. The entire farm was scourged by grain-crops, so long as it would bear any; and when matters had arrived at extremities, it was left to repose, till it was again fitted for a renewal of the like routine. All the minor details of tillage were equally imperfect; nor are they yet entirely remedied. In the Western Isles, and on the sea-coasts, the advantages from the rotation of crops, are, in many places, unknown. The caschrom is still in use: Nevertheless, agriculture is, like every thing else, improving; and the rise in the value of land is the best proof of the fact *.

One of the main advantages of the crofting system, has been to give the tenant a more comprehensive notion of the value of his possession. Whilst a farm was held by a great number of joint occupants, it often happened that they were saddled with the support of gratuitous hangers on, needy dependents or relations, who fed on the general bounty, or were allowed to roam upon the pasture-lands. It cannot be said that the evil is entirely remedied, as the sequel will shew; but

* Inquiry Register in Records of Chancery of Scotland.

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experience has brought wisdom, and the farmer who has his own industry alone to look to, has learned that he cannot permit this pernicious burden; and as he probably is limited to a restricted portion of pasture, or pays rent on each head of cattle, he substitutes cattle and sheep for the idle parasites of ancient times, and the preposterous herds of horses by which these pastures were so wastefully covered. But the crofting system is necessarily attended with great expense, great labour at least, and can barely, if it does, defray the rent. The occupier of one of these minute portions, raising little more produce than is enough for his own consumption, can have nothing to dispose of. Much industry is thus thrown away without an adequate return; and though considerable portions of waste land may be thus brought into culture, the same are too confined to lead to permanent results. To induce a tenant of capital to settle on these improved lands, with any hope of advantage, he would be necessitated to grasp at an extended surface; and thus what has actually happened, in many instances, is not unlooked for by those who have directed their attention to Highland affairs: namely, that the crofters, who now serve as pioneers, must yield to the introduction of better systems, and to capitalists, who, by having enlarged farms, may increase the productiveness of the soil, and add to the capabilities of the country. By the enlargement of farms, the number of mere tenants would decrease. A class of labourers would then arise, sure of work and bread; their condition in every view adequate to, most probably infinitely above, that of the present crofters. The scheme might be reprobated, if applied to more favoured lands; but the condition of the Highlands, destitute of capital, destitute of that important class in society who form the industrious and professional middling ranks, and limited to the laird and his inferior, warrants the change.

The character of the farmers in the different Highland

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districts has been variously estimated *. All over the northern counties, there still exists the order of tacksmen, constituting a link between the landed proprietor and the great bulk of the people. In Argyllshire, besides these tacksmen, who are commonly gentlemen, there are also many small farmers. In that county, as well as in certain other districts, tacksmen thirty or forty years ago, formed a numerous and respectable body. They are now gradually becoming extinct, in some instances, to the injury of the police of the county, particularly where the heritors are not redundant, little regard being paid to the poorer class of farmers, whom the lesser tenants consider no better than themselves, and who, indeed, are too often, little further advanced in point of information. These inherit, and blindly pursue, the customs and prejudices of their ancestors, the total extinction of which we can only hope for, by the gradual dissemination of knowledge. Perhaps no country displays better husbandry than is exhibited on the eastern shores of Ross. Thirty years have completely changed the appearance of this district. This alteration is to be imputed to the number of farmers from the south of Scotland, who have settled both there and in Cromartyshire; and to such perfection have the agriculturists of the former county brought the system, that they now annually grow wheat to the amount of 20,000 quarters, and export grain in quantities of not less than 10,000 quarters. Since Sutherland has become the theatre of the most extensive removal of the population to the sea-coast yet witnessed, the interior has become one vast solitude. The change has excited much angry discussion, which I do not intend to renew. Those who wish to attain a rational acquaintance with the motives which directed, and the means which attained these important consequences, cannot do better than have recourse to the candid and liberal work of Mr Loch.

* Sinclair's Report, iv. 306, 307.

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While it is admitted that the tacksmen * have been instrumental in retarding the improvement of the country, it has also been subject of complaint, that the crofters have either no leases at all granted to them, or that these are of very brief duration. True, it has been answered, that so long as they behave themselves, they are in no danger of ejectment, nor can a lease serve any good purpose, where there is nothing to improve, or no power of improving. But, tenure at will is, in these days, of a very precarious nature, disturbed by the merest accident of whim, anger, or speculation. Take away the inducement to labour by security, and you necessarily compel the crofter to pursue an indifferent and negligent system: But once grant them a lease, thereby affording them a probable chance of gain, and the crofters rise into a superior order. They take large portions of land, in the hopes of bettering their condition, and, by increased activity, they benefit both themselves and their landlord. The Isle of Islay is a proof how far tenants, who have the benefit of leases, can follow judicious examples set to them. The lease itself, its advantages, its restrictions, and the endless observations which the contract originates, form no part of the question, further than that the interest of landlord and tenant may be mutually promoted. All relics of feudal barbarity, especially the preposterous bondage of astriction to mills, should be carefully eradicated. Much misery is attendant on the system of allowing *meliorations* on farm buildings. An incoming tenant has thus to lay out the greater part of his capital, if he has any, in paying off the claims of the outgoing tenant: Hence the creation of a continual burden on the soil. These meliorations should be superseded, either by a deduction of rents being promised for all sums expended on buildings, or by the landlord's erecting proper office-houses himself, and adding 6 or 7 per cent. to the

* Sinclair's Report, iv. 302.

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rent by way of reimbursement. The letting of farms by auction to the highest bidder, is also injurious. Poor people are thereby tempted to give more than the lands are worth, from the mere inducement of a home to shelter them, though but for a single season; nor is self-assurance awanting to influence their decision, as they conceive they are just as qualified to turn the speculation to good account, as any other offerer who may appear. Perhaps the best way of settling rents, would be for landlords to have a fair valuation of their lands made up by competent judges, and to content themselves with giving the farm to the most respectable offerer, who would engage to pay the valuation ascertained to be just. A great deal has been done in all infant or rising communities, by the force of example. A few intelligent young men selected from the tenantry, and sent by their landlords to the Lowlands, to study the most approved methods of husbandry, would go far by their example, to shake the inveterate adherence to ancient systems, and enable the farmer to work his farm when taken, to the best account.

Everywhere throughout Scotland, and particularly in the Highlands, the interests of agriculture and commerce are deeply affected, as they are injured by entails; but it were to no purpose to swell this paper with an enumeration of the arguments so often used against this obnoxious thraldom. They are well known; yet, at this moment, such is the alarming increase of entails, that there are on record not less than between 1600 and 1700; but the momentous nature of the evil has at last seriously attracted the attention of Parliament.

Analogous to this branch of our subject, the trouble and expense of our Scottish conveyancing, as regards the titles of small crofters and villagers, may be instanced. I have been assured, on undoubted testimony, that the expense of a complete feudal right (including the feu-charters and sasines) to a house in the village of Kingussie, on the Duke of Gor-

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don's lands, would almost exceed the whole value of the subject.

Besides these causes, the fishery, the attention required to the manufacture of kelp, and an unfavourable climate, depress the mind of the farmer, while they distract his attention *. The implements of husbandry, in many quarters, are rude and imperfect to a high degree. Lobbans, or baskets, too often supply the place of carts. The Hebridian or Highland plough is a feeble instrument, and the labour expended both by man and beast, is disproportioned to the work done. However useful the *caschrom* or crooked spade may be in digging on stony ground or among rocks, there can be no question that the application of it to the field, properly so understood, is pernicious. It may here be observed, that the benefit of enclosures, generally speaking, requires to be better known and appreciated, as promoting the interest both of the landlord and tenant. One might imagine, that where the pasture and cultivated ground is so intermixed as it is in the Highlands and Western Isles, the necessity of defending the corn from the cattle would itself bespeak the danger of neglect. Enclosures would also temper the violence of the winds, which often greatly damage the grain-crops, and would prevent the severe calamities occasioned by the hoar-frosts to the potato-crop. The sycamore is peculiarly adapted to resist the wind, even on the sea-shore †. The common elder would also form a valuable enclosure. Draining and irrigation is almost as unknown in many places as enclosing. Of the advantage of rotation of crops, the smaller tenantry may be said to have little idea: Barley, oats, and potatoes are the standard commodities, but the neglect of green crops is a decided obstacle to improvement.

To these observations I may add some others on subjects which seem to militate against the prosperity of the Highlands;

* See Sinclair's Report, i. 167.

† See on this topic Macculloch, iii. 219, 215, iv. 244.

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and, first, may be noticed those instances, wherever the tenure of land is incompatible with the sentiments of the age. Of this nature, is the allotment of farms in miserable portions, anciently known as shilling, sixpenny, and three penny lands (Scots money), townships, lands held in runrig, steel-how and half foot. Payments in kind and services to the landlord are grievous; all rent should be paid in money. Back rents are bad. The struggle for land by a crowded population, with the small quantity in proportion to the demand, has led to exorbitant offers; and both in Inverness-shire and Ross-shire the rents have advanced in too high a proportion to the improvement of the country. This was peculiarly the case at the commencement of the late war, and although grain and cattle, which rose then with rents, have now fallen to their original standard, rents have scarcely suffered any diminution. The high prices given for wool six or seven years ago, did much mischief, as leading to inordinate speculation and expensive living.

My information leads me to suspect, however, that there are very few Highland farms stocked to the full extent they could bear, in proportion to the rents they pay. Two shillings and sixpence per sheep has been said to be a fair allowance for rent; but there are many farmers whose capital is so low, although they pay more than this, that they are not able to pasture their grounds efficiently. In many situations, the farmers are at a loss for markets. An intelligent correspondent writes to me, that he is of opinion, if the plan some time ago proposed, of a steam-vessel for the conveyance of live stock, could be carried into effect, it would materially benefit the northern counties. The tenants also often labour under great disadvantages, from not having proper accommodation for their cattle, and from want of winter food for them. They still too often overstock their farms with horses; and, owing to the impossibility of regular employment, which compels numbers of the inhabitants to leave their homes in search of

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work, the farmer is frequently obliged to retain a greater number of men-servants than he can well afford; and these having but little time to plough, from the badness of the climate, are utterly idle the greater part of the year. In the agricultural counties, an able ploughman will receive about £6 per annum, exclusive of board, and a female servant half that amount. The want of proper manure is a great impediment. Lime exists abundantly in the Highlands, but there is no coal to burn it. Peat has been used as fuel, and with some success, for this purpose. Sea-ware is occasionally laid down as manure with the dung of the cattle; yet it cannot be denied that a culpable neglect of such manure as is at hand is too often displayed *. The want of fuel is a misfortune under which the Highlands seriously labour. The principal objection to the use of turf or peat, is the great waste of time consumed in its preparation. No sooner is the seed in the ground, than peat-casting commences, and by the period it is completed, the summer is gone. If the season is a wet one, the peats cannot be got in at all †! To remedy this evil, it has been suggested, that timber should be raised for the sake of fuel: And many of the inconveniences which now press on the Highland farmer, may be obviated by the disposition of the landlords to use, and to encourage their tenantry to adopt, better implements of husbandry. Where landlords are resident, and have farms in their own occupation, in Argyllshire, the modern systems of agriculture are in general use, and good returns are obtained from them. Grain of better quality should likewise be imported by the proprietor, and sold at prime cost; and the general adoption of green crops should be a principal object. The innovation would be the means of adding to the domestic comforts of the tenant, of enriching the soil, and of improving and increasing the breed of cattle.

* See Dr Rennie, in Sinclair's Reports, vol. v.

† See Prize Essays of the Highland Society, vol. i. p. 306.

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The practice of irrigating pasture and meadow grounds might be introduced into the Highlands at large, with great advantage. Wherever we turn, we find plenteous streams descending from the mountains; and the height of the falls would facilitate the direction to be given to the waters on the lower grounds. The hay produced in the natural meadows, whilst it is of a coarse quality, is also a late crop, and is often saved at the expense of much time and labour; whereas, by practising irrigation, the herbage would be rendered finer, early and plenteous food would be provided for the young cattle, and employment be created for the peasant at that season when he has most time upon his hands *.

It is well known how valuable their little gardens prove to the Lowland peasantry, and how much they contribute to the comfort and industrious habits of the community. The time which hangs so heavily on the hands of the common Highlander, could not be better employed than in tending their little retreats, were he but once made sensible of their value. By this means, carrots, turnips, cabbage, kail, onions, beans, and pease might be added to his list of eatables; and, with a little more care and labour, he might be enabled to rear pigs and poultry, the sale of which would enable him to supply many wants †.

As a main source of revenue, and one raised from the natural and peculiar production of the country, the manufacture of kelp is deserving of attention. It may be said, indeed, to be the sole manufacture of the maritime Highlands. Various suggestions have been made since its introduction in

* Prize Essays of Highland Society, vol. i.

† In the central Highlands, the kail-yards attached to the small farms are now neglected. Thirty years ago an incoming tenant was more anxious to get his kail planted before his term of entry to his possession. This is now never considered as any object: He is satisfied to sow the yard with turnips.

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1789, to effect an increase of the quantity of this commodity *, and thereby lessen the fluctuations in revenue, which proprietors are subject to, from the precarious nature of the crop, the state of the market, or the importation of foreign barilla. On a topic involving such great and important interests to the population of the Highlands, these suggestions are entitled to the deepest consideration. To say nothing of the importance of the material, in a national point of view, the making of kelp affords the means of employment, and consequently of remuneration, to a large mass of a peculiar race, and lays the foundation for their attachment to habits of industry. The disadvantages with which this manufacture has to contend, are the inevitable consequences of local circumstances, "of excessive population, and consequent competition." One of the greatest is its occupying the tenant at a season when other objects also engross his attention. It is the misfortune of the Highlander, indeed, that he has to contend with a bad division of labour throughout the year. For a great part of it, he is totally unoccupied, whilst the cares of agriculture press upon him at one particular season. So long as the minute division of land continues, the crofter or tenant cannot work the kelp on his shores to advantage. In his own person, he combines the aggregate of that divided industry, by which, on an extensive farm, the details of its economy are carried on. Hence the necessity for the landlord retaining the kelp manufacture in his own hands; and, for his exacting from his small tenantry, the work necessary for its completion, since labourers ready for hire are not to be had. If, in return, the proprietor pays no wages, he allows an abatement of rent, on a certain allowance per ton, for what is manufactured, and the people thus receive an equivalent. In the Island of Tiree, and several others, the tenants deliver a fixed quantity of kelp, at a fixed price, in part of their rents.

* See Prize Essays of Highland Society, vol. i.

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Were greater attention paid to the important article of kelp, we might perhaps hope to see the gradual rise of an independent class of labourers, and fresh channels opened up for talent and capital. This is, however, to take a prospective view of an era which may be far distant, since it is a problem whether the late discoveries in chemistry have not ruined the kelp manufacture altogether! For the last two or three years, no kelp has been made in Argyllshire, except where it is of a very superior quality. Thus to present misery is added the aggravated reflection, that the people, from their excessive poverty, are unprepared to encounter the difficulties of a change. This will at once be seen if we consider their means of existence. The scale, indeed, is so low as scarcely to admit of further depression. It is one of universal penury.

I have already alluded to the outlet afforded to the superabundant and ill employed population of the maritime Highlands, by the fisheries. It is now pretty generally conceded, that the expectations entertained of the herring fishery have never been realized. The herring is a fish of capricious habits, and irregular in its visits, deserting one year a spot where it formerly abounded, and appearing again in quarters never dreamt of. Hence, almost all the fishing villages scattered along the western coasts, whether they owe their origin to the public spirit of individuals, or to the British Fishery Society, have suffered in their commercial prosperity. Tobermory, Tanera, Torridon, Ullapool, and other stations, have this tale to tell. One parish in Argyllshire has been known to fit out 100 boats, at an expense of L. 100 for each, or L. 10,000 in all; but far different is the spirit now abroad. The changes of haunt of the herring are singularly illustrated in the parallel cases of Loch Torridon and Gairloch. Whilst the former is entirely deserted, I have been assured by the proprietor of the latter, that, in his parish, where, twenty years ago, there were not twenty sailing

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boats, a glance at the Bay of Gairloch, on an evening during the herring-fishery, will shew from 500 to 600 boats under sail. The great error in the conduct of the herring-fishery (as those think who have paid most attention to the subject), lies in not following the fish to deep water, in place of merely occupying the bays and lochs; these gentlemen naturally concluding, from the success of the ancient Dutch fishery, that the herring is a permanent resident of our seas. To prosecute the fishery with success in *deep* water, I am informed that it would be requisite to follow the Dutch plan of having decked vessels to receive and cure the herrings at sea. The present boats used along the eastern coast could not go forty or fifty miles to sea, and return with their fish in condition to be cured; and, besides, they would not make above two fishings a week.

The expediency of bounties was long ago questioned *, and, as the result will shew, with judgment. Even with the advantage of the bounty, the fishing in busses is very little followed; while boats and small craft have increased in number, from the greater economy and profit attendant on this mode of fishing. For a long period, the intricate system of the salt laws was a fruitful source of complaint; and the inactivity of the natives themselves allowed the Dutch, and other competitors, to seize on the best stations. By the present custom, there are generally six men to a boat. From their great poverty, many of these are unable to avail themselves of the fishery as a means of food. It has become, therefore, very common, at the fishing stations, for the shop or store-keeper to fit out the requisites of hooks, tackle, &c., and provide for the family of the fisherman, taking his fish on his return, as an equivalent for these advances. Accounts are settled between them once a year; and, as the shopman generally contrives to keep a balance against the fisherman,

* See the Appendix to Sinclair's General Report of Scotland, vol. ii. p. 238. Prize Essays of Highland Society, vol. i. p. 261.

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a servitude of a novel but alarming nature is thus created. Hence arise dissatisfaction among the fishers, and repugnance to exertion, alike foolish, and prejudicial to themselves. Let the stores or shops be kept by whom they will, they must excite a commercial spirit; and monopoly, if monopoly there be, must sink from its very abuse, as the Highlanders become alive to their own comforts, and intimate with the opinions and conveniences of the south. Speculators from thence will, and, I believe, do, find it their interest to barter pretty extensively with the western Highlanders for their fish.

Till the beginning of this century the herring-fishery on the eastern coast was very limited; whilst the fish were, and continue to be, every way inferior to those on the western shores. By a singular revolution, the fishery on the east coast, eight years ago, entirely preponderated over that on the west. Nevertheless, a resident of great practical information tells me, that, from the want of a sufficient depth of water on the eastern coast of Ross-shire, he is apprehensive the herring-fishery will not succeed. It has almost been a failure, he adds, for the last three years, owing to the squally weather generally prevalent in August, which drives the fish from Ross and Sutherland to deep water; and this they find on the Caithness coast. The number of boats engaged in the cod and haddock, and in the herring-fishery, in the proper season, along the Inverness, Cromarty, and Tain Firths, is 319. The number of men and boys to whom employment is thus afforded, is 1200; and to fully as many men and women on shore. Very little is done in the way of curing herring in Inverness-shire. The fishermen from that county repair to Caithness in June, and return home in August or September, which would be in time for their own fishery; but several causes have combined to discourage them. The resort of herrings to the west coast, for some years back, has been precarious. Such as appear in any quantity have been small, and the fishermen are restricted with respect to the size of

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the meshes of their nets; so that these small herrings, which are very fine in quality, slip through them.

If the herring fishery has not met with that success which was anticipated, it is certain that the white fishery has been equally ill, if not less, attended to by the natives. They fish when they are hungry, but they have no idea of laying up a store for future contingencies. The fishermen at Avoch, in Ross-shire, after a successful season, have refused to supply the town of Inverness with fish, at any cost, whilst their money lasted. When it is spent, they gladly set off to sea again. By greater encouragement, the cod, ling, and other white fish, with which our coasts abound, might be made the means of a successful commerce, of wealth, and improved food to the population. The same remark, I am assured, applies to the cod and ling-fishing as to the herring. It is prosecuted in too shallow water. Good cod is seldom seen in the north, and the prices are too paltry to encourage the bringing in of better. Three to four pence is the common price in the Cromarty Firth for a full sized cod. The lobster fishery, at present totally neglected, might also be prosecuted with profit to the Highlands. It was tried on the Ross-shire coast, about twenty years ago, from whatever cause, with little success. Judging from the extensive trade in stock-fish, carried on by the Swedes, Norwegians, Danes, and other northern powers with Catholic countries, there is reason to believe an advantageous intercourse might be opened up by capitalists with the Italian states, for the supplying them with salted fish from the Highland seas, in those seasons set apart as fasts by the Romish church. One very evident result of such an enterprize, would be the removal of those obstacles which are now advanced by the fishermen as palliatives for their indolence. They complain that the people will not eat salt fish, and they raise difficulties to the procuring of the salt itself. Find a certain supply, and there will lack no demands from abroad, if not from home: make but the attempt, and no difficulty in pro-

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curing the material for curing the fish will arise, which cannot be overcome. Perhaps the fishing of the numerous lakes and rivers in the Highlands, now unprofitable alike to the proprietor and tenant, might be made a valuable addition to the income of the one, and the comforts of the other. Many of the western bays abound with oysters, yet they are totally overlooked. Suggestions for the improvement of the fisheries naturally carry along with them a recommendation that greater attention should be paid to the rearing of oak and other wood. Nearly the whole western coast of the Highlands is one continued stool of oak; and proprietors should be made aware of the value of these tracts, the judicious thinnings on which would materially add to their revenue.

Any view of the condition of the Highlands, however superficial, must embrace the important subject of manufactures. It is one, indeed, on which many theories have been built, and much ink, and much money, thrown away. The cause of failure seems to have been the great precipitancy with which the speculations were entered into. With a singular folly, the projectors never appear to have reflected that the Highland character was to be operated upon, by the *gradual* introduction of better systems, not by the hasty hand of inconsiderate reform, inimical to their feelings and prejudices. The late Mr Dale, with the most patriotic intentions, made the experiment of introducing manufactures into Inverness-shire, but the scheme proved abortive. In like manner, the attempts at erecting villages have only been so many failures. So far back as 1602, the advantages to be derived from the fisheries had attracted the attention of Government. To protect the interests of the parties embarked in them, and to found, as they fondly imagined, nurseries for arts and commerce, three towns were appointed by the Ministers of the Crown to be built in different parts of the Highlands,—one in Cantyre, another in Lochaber, and a third in the Isle of Lewis, which were equally to enjoy the privileges of royal boroughs. A colony

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of Dutch, skilled in commercial intelligence, was sent from Fife to the Isle of Lewis; which was destined to become the theatre of the first experiment, and of the first failure. The inhabitants, jealous of foreign interference, effected the ruin of the settlement in a single night; and James's accession to the English throne prevented further attention to the project *. In truth, there neither exists the industry or division of labour which is required to form a large community; and we must be content to let the Highlanders remain scattered on their mountains "in the indolent freedom of a pastoral life," till they are operated upon, in the course of circumstances, by those countless wants which spring up in a more advanced state of society.

I have, at an earlier part of this paper, brought forward some of the arguments which, it might be thought, would warrant the introduction of manufactures into the Highlands with success. The history of the establishments themselves is the best commentary on the project, and proves how visionary are often the most feasable schemes. In the town of Inverness, for example, there have been established, since the beginning of this century, two breweries, two manufactories for hempen cloth, and one for coarse cloth. The brewery companies are long ago extinct. The manufactories still exist; but the partners of the coarse cloth company, on the dissolution of the concern, instead of drawing any profits, had to pay their respective proportion of debts. About the year 1760, by the suggestions of the late Lord Kames, Mr William Welsh came from Dalkeith to Inverness, and established a tan-work in the vicinity of the town. In this undertaking he was eminently successful, and his prosperity led others to imitate his example. Four tan-works have, accordingly, at various periods, started up, but they experienced only an

* See Robertson's Hist. vol. ii. p. 105. Pinkerton's Enquiry, vol. ii. p. 141.

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ephemeral existence, whilst the original continues a thriving concern.

These failures should by no means, however, damp the ardour which would attempt to teach the Highlander habits of sedentary industry. Time and application will effect much; and to argue, that the feelings of the natives are at variance with any in-door work, is only to repress their energy and make them sit down in contented indifference. The people ought to be encouraged in such domestic manufactures as already exist, and are known *; an advice long ago given by an eminent merchant and manufacturer †. A steady attention to these homely manufactures would raise the wages of the workman, and cause a greater circulation of money. The spinning of flax and wool might be extended, and made more productive. Perhaps, by proper care, the wool might be wrought into rugs and carpets, and a lucrative commerce opened up in this branch for domestic consumption, if not for a foreign market. This might be done by the people themselves, without the aid of capital, as exemplified in the village of Claddy, on the banks of Loch Awe. A good carpet, or fine plaid, made by a peasant, his wife, or daughter, in the dreary winter months, would give the means either of enlarging their operations, or of purchasing such domestic implements as they stood in need of. Thus, a train would be laid for the gradual dissemination of industrious habits, and the introduction of future manufactures on an extensive and successful scale.

The excessive—in many instances, too sudden—rise of rents, led to the removal of the old tenantry, without an opportunity being afforded them to overcome long cherished

* There is a considerable quantity of plaiding and coarse stockings made by the lower class of Inverness-shire, and Wester Ross, which they sell for home consumption at the markets. These poor people, however, are often compelled to pay the sheep-farmers *double* the price for the wool they require, which the latter receive from the Yorkshire woolstapler.

† App. 39. to Lord Selkirk's Report.

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habits, or appreciate better systems. A charge has been pretty sweepingly brought against all Highland landlords—that, in the introduction of the sheep system, they paid little regard to any rule but the increase of their rents. To gratify this passion, they met with great temptations from south country speculators, who took large tracts of land and pasture, frequently at higher rents than they had capital for. Bankruptcy followed,—the land is unoccupied,—and the aborigines have long since departed.

Happily these effects are not universal: there were landlords who, with paternal care, gradually demonstrated the possibility of increased incomes with a contented tenantry; "and wherever we find this union of profit with justice, the bond of association is drawn together by ties of affection and attachment infinitely more deserving of admiration than the blind obedience of ancient times."

To turn now to another and important subject. When Dr Johnson uttered his invective against our country, for its desolate aspect, he little dreamt that the sarcasm was to effect such important results as it has done. To imagine, however, that it was strictly applicable to the Highlands, as well as to the bleak coasts of Aberdeen, would be very erroneous. The Highlands, both in ancient and modern times, have abounded with extensive forests. Along the shores of Argyll, and especially in the central swell of the Inverness mountains, remains of ancient woods are to be met with, which, by many, have been conjectured to have formed part of the *Sylva Caledonica*. The trunks of gigantic oaks discovered in the Highlands, in quarters where nothing now meets the eye but bleak moors, bear witness that the climate is favourable to the rearing of timber. The selfish pretext, that the profits of plantations yield a distant and tardy return, is now beginning to be exploded. This is evinced by the immense plantations, which, in almost every quarter

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of Scotland, Highland as well as Lowland, are springing up. It is to be regretted, however, that so much ground has been occupied by Scottish fir. Oak, and other hard wood, would grow just as well, and be more productive. The larch, in particular, by the annual casting of its leaves, causes the destruction of the coarse heather, and converts the barren moor into pasture land. Both it and the oak are of service for nautical purposes; and there is much plausibility in a scheme which, I believe, was once submitted to the Highland Society,—that Government should provide against the uncertain supplies from abroad in time of war, by buying and converting some of the extensive wastes on the western shores, still abounding with stools of oak, into a royal forest of that noble tree. Who can tell, but by then having the material at command, the Highlanders might turn their attention to ship-building, and become a commercial and enterprizing people? Of those who have most largely contributed to the improvement of the Highlands, by planting the greatest extent of barren wastes, we must give the first place to the Duke of Atholl. Other proprietors have been equally public spirited. Several millions of trees, of all sorts, have been set on the Lovat estates, for a considerable period past. I am informed, that, in Cromartyshire, very little has been done of late in the way of planting; and that, with the exception of Ballindalloch's property, planting has been at a stand for the last twenty years in Strathspey and Badenoch. In the upper districts of Banffshire, the property is in the hands of large proprietors, by whom also planting has been very much neglected. Plantations to a great extent are laid down by many gentlemen of Argyllshire; and, I am assured, are gradually on the increase.

In offering a few remarks on the commercial relations of the Highlands, I shall commence with Cromarty. Its exports consist chiefly of wheat, pork, and hemp-bagging, of which

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latter there is a factory belonging to an English company, which gives employment to about 200 individuals. For the last ten years the average exports of pork have been L. 12,000 per annum. The pork is cured in much the same way as at Berwick for the London market, and is retailed by cheesemongers there. The imports consist of hempen cloth, groceries, &c. Five London and six Leith smacks call at the harbour, and land goods for Tain, Dingwall and Invergordon.

Fortrose and Avoch are visited by regular traders from London, Leith, Aberdeen and Dundee, and occasional vessels for England, Ireland, and Russia. The imports chiefly consist of coal, lime, slates, and oak staves; and the exports of coal-props, herring, staves for herring barrels, some salmon, and a small quantity of pork.

Many thousand bolls of grain and gallons of whisky are annually shipped from the pier of Ballintraed, in the Dingwall Firth, to Leith, Aberdeen, Glasgow and Liverpool. A canal of moderate dimensions runs from Dingwall into the channel of the River Conan; but the difficulty of finding sufficient depth of water, added to its being often choked up with mud, deters vessels of any size from visiting it.

Inverness, as already remarked, was long the emporium of both foreign and domestic commodities, but since the suppression of the last rebellion, her channels of commerce have gradually ebbed, and have at length been completely dried up. About the year 1803, an intercourse was opened up with London, but the traders were few, and the voyages distant. The five smacks, of 130 tons each, at present engaged, sail every ten days between the two ports. Three regular traders from Liverpool have been established since the opening of the Caledonian Canal, in 1822. With Leith there is a regular communication by six vessels, and with Aberdeen by four. There has been an advance of the shore-dues, from

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1802 to the present day, of L. 540. Yet the harbour by no means presents the animated bustle of a great sea-port.

The exports from Fort-William consist chiefly of herring, bark, and wool; and the imports of tar, wood, flax, oat-meal, salt, and groceries; but neither in very great quantities.

Besides the chief anchorages of Oban and Inverary, Argyllshire possesses various harbours and piers, many of them formed or improved by the commissioners of Highland roads and bridges, and admirably adapted for receiving traders;—Port-davane shipping-pier, Tarbet harbour and pier, and in the Isles, Tobermory, in Mull, and the harbour of Jura. The excellent harbour of Stornoway, in the Island of Lewis, renders it an important station for vessels in the American and Baltic trade; and the necessity of opening up a direct route to this populous isle, and giving access from the south to an extensive sea-coast of nearly seventy miles, thickly inhabited by fishermen living in small villages, has been very properly remarked by the Commissioners *. Large quantities of potatoes are annually exported from Campbelltown, together with a considerable quantity of grain. There are several thriving distilleries there, as well as in the island of Islay, and much barley is imported for their use. Other districts of Argyll, as Lorne, Cowal, and Mull, possess distilleries, which supply the southern markets. The imports into Inverary consist chiefly of herrings. In other respects, it may be said not to carry on any commerce.

It has already been perceived, that in the foregoing remarks I have mingled together the statements respecting the condition of the Highlands, with suggestions for its improvement. This may not be the most methodical plan of treating the subject, but I have found it necessary, in order to prevent omissions; and, in fact, the remedy seems to me to find its place most naturally beside the disease. The schemes

* Fourth Report, p. 36.

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that have been suggested for the improvement of the Highlands are numerous and discordant, as might be expected. Theories are pleasing in prospective, and, apparently, easy of execution; but the history of all attempts to effect a total and instantaneous revolution in Highland sentiment and manners, demonstrates the fallacious nature of the views entertained. The Highlanders, like all other people, are to be operated upon by gradual means. Convince them of the superiority of your mode of thinking and acting; but do not attempt force. Let their own eyes and their own judgment be allowed free scope, and there is no fear of the result. I would say, that I know no better means of improving their condition than that of forwarding the communication of those conveniences of life, and those principles of action, which are daily used and acted upon by the inhabitants of the more advanced portions of the empire; nor any more effective method of checking any evil tendency resulting from their thus imbibing new opinions, than that of providing for the universal education and religious instruction of the lower classes. It is obviously impossible to reason correctly on the varied capabilities which may yet be brought into play in this interesting portion of the empire. I would say to those intrusted with the dispensation of the public money, and to the proprietors of extensive estates,—Open up every quarter, intersect it with roads, and you will thus infuse a new spirit in the people, find outlets for your own commodities, and experience a corresponding return of articles which are needed by you, while you will greatly benefit by an intercourse with strangers, and partake of their wealth. The numerous quarries and metallic veins which traverse whole districts, will then be accessible to capitalists. Then, what advantages are likely to result from the intercourse, by means of coaches and steam-boats, with the south? It is stated, in the Fourteenth Report of the Government Commissioners, that upwards of 13,000 passengers went last year through

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the Crinan Canal. Take into calculation, moreover, that forty-four coaches arrive at, and as many depart from, Inverness every week; that eight steam-boats plied regularly, some along the Caledonian Canal, others to the Western Isles, and an occasional one from Leith to Inverness; and that these facilities for travelling continue: and it is not too much to estimate the entire number of persons thus brought into the Highlands and Isles in the course of a year at 20,000. Supposing each individual to spend L. 2, a sum of L. 40,000 is thus annually circulated, independent of the L. 10,000 spent by Government in forming roads, and making other improvements. Surely this is a most gratifying picture; and the more so, that all has been achieved within the present century. Every thing considered, the wonder is, not that the Highlanders have not done more, but that they have in so short a space effected so much.

If I have been led to speak despondingly of the state of our Highland population, still I would be far from joining with those who despair of amelioration. If the Highland peasant have his faults, he has his virtues also. If he has doffed the chivalrous demeanour of olden times, he has retained a rectitude of principle which, though he be poor, restrains him from crime. The robberies, murders, and atrocities of more favoured countries, are unknown. From the report transmitted by Provost Robertson to the Committee of the House of Commons, on 15th May 1818, we learn that by far the greater number of the criminal prisoners in the jail of Inverness (which, as the connecting medium between north and south, might be supposed to receive from time to time, an additional population of very diversified materials) are only confined for delinquencies of a minor sort, as desertion, smuggling, and other offences against the excise laws.

Whilst, unhappily, the light of knowledge has beamed but feebly on his glens, the Highlander's conduct has displayed

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"the inestimable virtues of integrity and charity;"—as a nation, our mountaineers' "liberality to the poor, and the independent spirit of the poor themselves, are fully evinced by the trifling and almost nominal amount of the public funds for their relief*." "Their conduct in the field, and their general qualities of firmness and spirit," have been depicted by one eminently qualified for the task; nor ought we to forget that acuteness of disposition so remarkably prevalent; a disposition, too often ridiculed by ignorant tourists, as tending to impertinent curiosity; but which, by judicious treatment, might be made the means of imparting much useful knowledge. Infinitely preferable to the stupidity of the English peasant, is that readiness of question and retort evinced by the most ordinary Highlander. There is good material in this thirst for intelligence, if turned to right account. But whilst the Highlander retains his natural enthusiasm, there is little doubt that it has too often "been converted into gloomy and morose fanaticism†."

I am well aware that I have left much unsaid on the various topics which have engaged my attention, and that I have but ill succeeded in presenting a picture of the actual condition of the Highlands. To do justice to the subject would require a series of essays. Nor can I indulge the hope, that all my strictures will be received with satisfaction. I think it no injustice to my countrymen, however, to expose their wants, to deplore their failings, and to attempt their improvement. Their faults have too often been concealed, and their character misrepresented, from mistaken pride, or interested motives. If it is thought advisable that our mountaineers should still be arrayed in the garb of Old Gaul, let the feeling be indulged. But if any enthusiast would carry matters farther, let him be told, that the characteristics of feudalism are incompatible with an age like the present. Free-

* General Stewart's Sketches, i. 133. † Ibid. i. 125.

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dom has become the birthright of the meanest peasant, as much as of the proudest noble. The increasing intercourse with the other parts of the kingdom must excite a similarity of sentiment, and the distinction between the Highlander and Lowlander must eventually be lost.

When the capabilities of his country shall have been fully developed, when new desires shall have been awakened, fresh incentives to enterprise called into being, and corresponding benefits produced, we may be assured that the Highland warrior will wield his claymore with as vigorous an arm, and march to action with as bold a front, as when heretofore he marshalled for the lawless foray, or shed his blood in the shock of conflicting clans.

DESCRIPTION OF A ROAD-LEVELLER, OR SIMPLE INSTRUMENT FOR MEASURING THE INCLINATION OF ROADS ON ANY SLOPES IN GENERAL. *Communicated by JAMES HUNTER, Esq. of Thurston, in a Letter to the Secretary.*

THURSTON, DUNBAR,
February 20. 1829.

I HAVE the pleasure to send you an instrument made by myself, which I have no doubt many a country gentleman has often expressed a wish to have, but did not know that it could be so easily made, or would be so very correct in its measurements, after being obtained. I do not know what to call it, but its use is to measure relative heights, such as the slope of a road, or of a run of water, or to plan the proper line for making a road, &c., at certain slopes commonly called rises of 1 in 10, 1 in 12, 1 in 20, &c. It may also be applied to many other purposes of the same nature. I was induced to attempt the invention of the instrument, by my friend Colonel Napier of Woodcot asking me if I knew of

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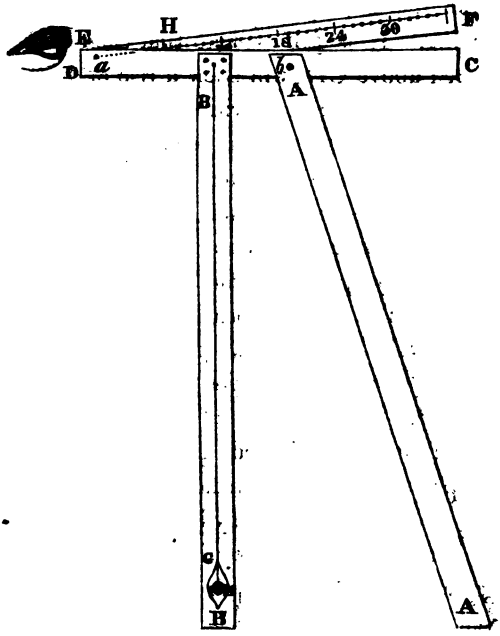
any such upon a simple construction. I thought of Mr Dalyell's, which is published in the 5th volume of the Highland Society's Transactions, but could not at the moment lay my hand upon this work; and since that I perceive, that, although the instrument is an excellent one, yet mine is so far different, that I think you will probably conceive there can be no harm in offering both to the public. If my instrument has been previously in use, it is very easy to take no more notice of this letter; but I am not aware that it has been before invented.

I shall now proceed to the description, premising that any country carpenter can make it with perfect ease; and the scales are of such large dimensions, that no great nicety is required in the observations.



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A slip of wood must be procured, measuring 3 inches broad, by ½ inch thick, and 16 feet 9 inches long, which must be cut into four lengths of 5 feet 3 inches, 5 feet, 3 feet 3 inches, and 3 feet 3 inches,—marked as follows:

	Feet.		Inches.
AA	5	.	3
BB	5	.	0
CD	3	.	3
EF	3	.	3

Six thick screw-nails are also required, one inch long. Join CD and EF by a screw-nail inserted about two inches from the end of each, and exactly one inch from their upper surfaces, as marked *a*. From the point *a*, upon EF, draw a line measuring 36 inches towards F, and exactly one inch distant from the upper surface, and divide this line into 36 parts or inches. It is self-evident that each of these points, when elevated above CD, will shew a rise of 1 in 15, 20, 34, &c. as the case may be, provided CD shall be horizontal; and EF shall point to a pole or mark as high above the ground as CD is; this is effected by fixing BB firmly upon CD, at right angles, and either having a plummet G suspended, as in the figure, or a spirit-level fixed on the top of CD. I prefer the plummet made of bobbin or small cord, with a pierced bullet at the bottom. The instrument is retained in a level or horizontal position by the assistance of AA, which is upon a moveable pivot made by one of the screw-nails at *b*. The distance of AA from BB is immaterial. A small stop is fastened at the back of BB, for the purpose of preventing EF from falling below CD.

The rise of a road is shewn by looking from E towards F; the fall of a road, of course, by looking from F towards E, and, if great correctness is required, the observation should be reversed.

I am not aware that any farther description is required,

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and requesting that you will oblige me, by presenting the instrument to the Highland Society.—I have the honour to be, &c.

Note by the Editor.—We have examined the above instrument, and, from its simplicity and accuracy, we have no doubt it would be found extremely useful to country gentlemen, or others engaged in the planning of new approaches, or other works requiring attention to slopes. Levelling instruments are not always at hand, and nothing seems better calculated, on any emergency, to supply the want of them. In windy weather, the plummet is rather inconvenient, and a simple spirit level-glass, set into the frame, will be found very manageable. Since the above description was sent us, Mr Hunter suggests a change in the scale, which it is material to notice. In the above case, it will be observed the distances are marked on the slope, whereas the inclinations are always understood in reference to the true horizontal distance. In this case, the piece CD should be divided into inches, and numbered in the upper edge, from above *a* towards C; and when the line *a*, &c., by being raised or depressed, comes to intersect any of the numbers, as 10, 15, 20, &c. that is the true slope of 1 in 10, 1 in 15, 1 in 20, &c.

DESCRIPTION OF AN IMPROVEMENT IN THE CONSTRUCTION OF THE AXLES AND NAVES OF THE WHEELS OF WAGGONS FOR RAILWAYS. *Invented by* JAMES AIRD *and* JAMES DUNLOP, *at Ayr Colliery.*

THIS improvement consists in closing the bush on the nave of the wheel on the outside, by which means the grease is prevented from escaping, as is already done in a different way in the wheels of mail coaches and gigs; and instead of a linch-pin, the wheel is held on the axle by means of a sort of bracket fixed on and embracing the axle frame with two tails, and bearing against a shoulder or flanche, which projects all round upon the inner extremity of the nave. The tails only of this bracket are fixed by screws, one in each on which the bracket turns, and can thus be easily disengaged, and the wheel taken out for cleaning or greas-

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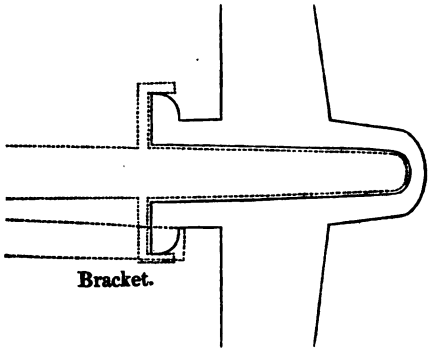
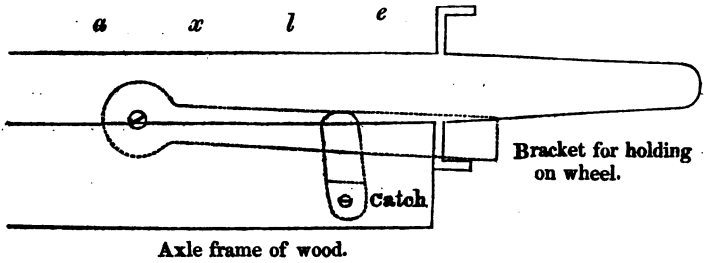
ing. When in its place, the bracket is held by a catch. The axle is of iron, and fixed to a strong frame of wood. The construction will be understood by the annexed sketches.

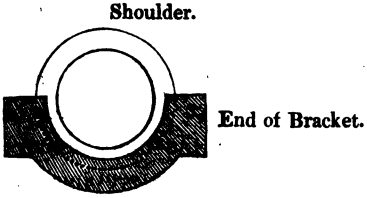
Section of Nave of Wheel.



Section of Axle.



End View of Shoulder and Bracket.



The advantages of this construction are detailed in the following letter from Mr Taylor; and where loose wheels are used in waggons, it is an obvious improvement. The idea,

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however, is not new; and a similar plan, we understand, has been long in use on the railways in Monmouthshire. Loose wheels, also, are now going quite out on the most improved railways, the advantages of having them fast on the axle being proved by many who have tried both ways. The only inconvenience attending them, arises in short turns of the railway, where they create great resistance; and this circumstance may prevent them from being adopted on colliery railways, where such turns are often unavoidable.

Copy of a Letter from GEORGE TAYLOR, *Esq. Ayr Colliery, to Mr* STEVENSON, *Civil Engineer, in regard to the Improved Wheel and Axle for Coal Waggons, 4th June* 1824.

THE inventors are two of our working mechanics. The idea was first struck out by James Aird, blacksmith, and was improved upon and brought to its present state by the united efforts of him and James Dunlop, engine-wright.

The invention I conceive of much importance to the proprietors of railways; as, by means of it, the following advantages are attained over the common wheel and axle:—

1st, Three fourth parts of the grease are saved.

2d, The friction is much lessened, as no sand or dust can get into the axle, by which the waggons are much easier drawn, and one horse will be able to draw a greater number.

We are proceeding to make the alteration on all our waggons, and a saving of L. 150 or L. 200 annually is expected.

We purpose, also, to apply the invention to the small waggons below ground. I hope the invention will appear of so much importance, as to induce the Society to confer premiums upon the parties I have mentioned, and I hope you will feel yourself enabled to concur with me in saying, that it is the greatest improvement which coal waggons have received. I am, &c.

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ON THE CULTURE OF POTATOES IN THE DISTRICT OF KINTYRE. *Communicated in a Letter to the Secretary, by* JOHN L. STEWART, *Esq. younger of Glenbuckie.*

AGREEABLY to my promise, I now beg leave to send you the following detail of the manner in which potatoes are cultivated in Kintyre.

In the prospect of raising that crop, three modes of applying the manure are in practice. The first is to cart it out, and spread it upon the surface of the ground, before being broken up in the month of February. Another is, not to lead out the dung until the ground is prepared for receiving the seed, and then such part of it as is short and capable of mixture with the earth is spread upon the surface of the prepared ground, just before the plough has commenced drilling for the reception of the seed. And the last, where the dung is of a different description, that is to say, long, and incapable of being covered into the drill, to lay it into it by *grapes*, on the top of the seed. The first of these methods, although it yields a superior potato, is by far the most expensive, requiring a greater proportion of manure. I consider the second the most profitable of the three; and the last, I think, should never be adopted, excepting where the manure, as already mentioned, cannot be sufficiently incorporated with the soil, and it therefore becomes necessary to lay it in the drill on the top of the seed.

The land is generally ploughed as early in spring as possible, and that at least twice. In cases where the two ploughings do not sufficiently pulverize the ground, it receives a third, and after every ploughing is well harrowed. The greatest attention ought always to be given to these preparatory operations.

The ground being now prepared, and the season for planting arrived, drills are made for receiving the seed with the

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common plough; these are drawn about two feet asunder, and three inches in depth. The first seven of them are all drawn from one end of the field, the plough returning empty from the other end, in order to afford time and room for the operation of putting in the seed, and also the dung, where this last operation is rendered necessary. By the time the ploughman has drawn three of these shallow drills or furrows, the persons in charge of the seed begin to plant the first of them, laying each plant at a distance of from nine to ten inches; these are followed by others who put the dung on the top of it, in the case already mentioned, where the manure is to be put into the drill. The ploughman, having completed seven of these drills, may now proceed to return, by ploughing to the depth of seven inches between the first and second drills, so as to cover the seed in the first. He then opens another of the shallow drills of three inches, at the distance of two feet, as before mentioned, from the last which he had made, being the seventh; and returning back, he makes another of the seven-inch deep furrows between the second and third rows of seed, which covers the second: returning he opens another seed-drill; and back again a deep one, between the third and fourth rows of seed, which covers the third row; and so on from each end of the field. In this manner the drilling and planting will proceed, without any interruption or interference the one with the other, the plough having at first attained a sufficient distance from the planters to have always a drill open before they can overtake it. The great advantage of placing the seed so much nearer the surface than the deeper furrow alongside of it is, that it is more effectually preserved from the bad effects of wet or damp, consequently less liable to be injured by frost, and it springs sooner.

In this state the field is allowed to remain from a fortnight to three weeks, when it is cross-harrowed to a perfect level. Afterwards, as soon as the drills can be distinguished by the potatoes shooting above the ground, the plough is again applied,

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and the drills are formed as before; but in doing so, the plough is taken as close as possible to the plant upon both sides; on one side the plough is lightly put in, but on the other it is inserted as deep as possible, throwing the soil over on its neighbouring row of seed, filling up the vacuum which the plough had previously left at it, and forming at the same time a ridge, as it was originally, on the top of the plant. What is thus ploughed in the forenoon is cross-harrowed completely level during the same afternoon. The great advantage which I apprehend to be derived from this process, is the loosening of the soil, destroying the weeds, and the saving of hand-hoeing. I am satisfied, from my own particular experience and observation, that this mode of treating the young growth of the potato is far preferable to any other I have seen practised, either here or elsewhere, however forbidding the rough usage thus given to the young plant may appear to one inexperienced in this particular mode of cultivating it.

As soon as the weeds begin to appear, the plough is again introduced, to what, in the idiom of this country, is called "taking from the potatoes," which is done by running pretty close to the plant on both sides, so that a slight ridge is thrown up between the line of plants, and in this situation they remain for eight days, when the plant is "put to" by again applying the plough between the rows, and separating the earth composing the middle ridge above mentioned, towards the plant on each side, but without covering it. After this, the process of "putting to" of earth is continued as the plant grows, and takes place at least twice, until the stems are so high, that a single horse going among them may seriously injure them. The "putting to" will now be understood as a deeper insertion of the plough in the middle of the drill.

If, in spite of all these operations to pulverise the ground and destroy the weeds, any should happen to make their ap-

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pearance previous to the last visit of the plough, the weeds are carefully removed by the hand-weeding, which never costs above 3d. per acre, and then the plant is no longer disturbed until it has attained maturity. The whole of the labour of ploughing, drilling, "taking from" and putting to" the potatoes as above described, is performed with the common plough.

I wish, that, in detailing these operations, I may have made myself sufficiently intelligible. If, however, you should desire any further information on the subject, I shall be most happy to afford you every satisfaction in my power. I am, &c.

ACCOUNT OF THE DRAINAGE OF CERTAIN FARMS ON THE ESTATE OF O. TYNDALL BRUCE, ESQ. OF FALKLAND. *Communicated by Mr ANDREW DUDGEON, Tenant in Falkland Wood.*

THE draining operations of the farms of Falkland Wood and Darnoe, consisting of about 750 English acres, a brief account of which it is proposed to submit very respectfully to the consideration of the Highland Society, were commenced at Martinmas 1825; and very liberal conditions having been held out to the tenant, by the then proprietor, the late John Bruce, Esq. there were cut between that time and the month of April 1828, 895 roods of water runs, 2144 roods of ditches, and 3204 roods of under drains, by contract according to specifications, except the carriages, the expense of which varied according to the distance from the quarry.

These lands are very flat, with an acclivity of not more than twelve feet from east to west on the north side, and from twelve to sixteen from east to west on the south side,

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and consist of three varieties of soil: 1*st*, What appeared before draining a deep black vegetable moss, upon a firm white sand, is now a rich loam, quite consolidated; 2*d*, A rich brown loam upon gravel, white sand and freestone, extremely wet for want of outlets; 3*d*, A free soil, with a mixture of clay, upon a very hard retentive red clay subsoil.

On the north and south sides of the farms, it was found necessary to make cuts of from five to ten feet deep, three feet wide at the bottom, with slopes of from nine to eighteen inches on the foot, on each side, according to the nature of the soil, so as to form main water-runs; and subdivision ditches were cut from five to six feet in depth, of the width of two feet at bottom, and with slopes on each side of from nine to twelve inches on the foot, by which means the seat of the springs was detected, and the lands laid out into fields of from fifteen to thirty-two acres each. These cuts served also as outlets for the under drains.

The obstacles arising from quicksands, of which we encountered many, were obviated by first forming the ditches and water-runs, to the full width of the slopes at top, but not to the full depth, and throwing the earth well off the sides. The cuts were then deepened progressively in the same manner, allowing sufficient time for the water to ooze out of one portion, and the earth to subside before commencing another, and paying strict attention to have the earth immediately removed from the top of the slopes to prevent sliding.

All the under drains are on an average four feet deep, the main drains were formed at the top two feet wide, at bottom twenty inches, with built conduits, from a foot to sixteen inches high, by eight inches in width, with substantial covers, well packed and wedged on each side, to prevent too much weight resting on the side-walls. The materials used in filling the drains consisted of freestone, of which there is a very fine quarry nearly in the centre of the farms. Five double cart

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loads of stones were found sufficient for the main drains, and three for the side drains per rood, of six yards to the rood. By these the drains were filled to within sixteen inches of the surface, and the stones on the top were broken almost to sand, to prevent the surface from being washed into the drains.

I may here mention, in allusion to measurement, and to prevent repetition, that all the work was specified and estimated by the rood of six yards. As I do not consider it very material to detail the prices of the water-runs and sub-division-ditches on the different varieties of soil mentioned, I may state, generally, that the prices varied according to the extent of the cut, and description of soil, from 2s. 2d. to 7s. 6d. per rood; and shall therefore confine myself particularly to the under-draining. The main drains, on the first description of soil mentioned, cost from 3s. 10d. to 4s. 6d., and the side-drains from 2s. 10d. to 3s. 4d.; the second main drains 4s. 4d., side-drains 3s.; the third main drains 3s. 10d. to 4s., side-drains from 2s. 10d. to 3s. per rood; all exclusive of the carriage of the stones.

Almost all the drains on this division were cut for the purpose of carrying off surface-water, and we have experienced great advantage in throwing back the hard red clay found in the bottoms, and forcing in the loose surface-earth above the stones, by which the water escaped easily; but where this was neglected, however small the space, the drains were of little avail.

In driving up an extensive cut for the purpose of draining the quarry, one of the workmen, at the depth of twenty-three feet in pure free-stone, struck his pick into an uncommonly strong spring, which rose to the height of seven feet, and continued to do so until a proper outlet was made, by which six acres of wet boggy moss, at the distance of 300 yards, were laid perfectly dry. It has also cut off the supply from an extensive spring in the adjacent field, generally known by the name of Murray's Well.

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It has been questioned, whether our under drains were not too deep; but this we have never found to be the case, as they have all had the desired effect, and are in as good a state of repair as when first made. We cut through a great many old drains, all of which had failed by being too *ebb* cut, and improperly filled, some with wood, and others with large stones; but these defects were obviated in the way above mentioned. Many disadvantages are observable in *ebb* drains, but we have never experienced any in deep ones, if filled with stones of a fit size, and properly broken on the top.

It may be stated, in conclusion, that the effect of the above operations has been to convert a very considerable extent of land, a great part of which was formerly a mere swamp, into rich and fertile soil, now producing luxuriant crops of oats, turnips and grass. It may further be mentioned, that, to the land thus drained, lime and bone manure have been applied with the greatest success; by which the appearance of the soil has been completely changed; and that especially where bone-manure has been used, far better crops have been raised than by any other species of manure whatever.

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ESSAYS ON EMBANKMENTS.

[In the year 1824, the Highland Society proposed for a Prize-Essay the important subject of "Embankments on Rivers, Lakes, and Arms of the Sea;" the Essay to embrace the most satisfactory account of such as had been constructed, with plans, sections, estimates of their expense, and suggestions of any improvements which might occur to the writer. Three Essays were received: one of which, by Mr James Blaikie, Advocate, Aberdeen, is given entire, as it contains an interesting account of the Embankments on the River Don, with details of the operations, estimates of the expense, and practical hints, which may be useful in similar cases. Of the other two, abstracts are here given. Besides these Essays, for which Premiums were awarded, the Society received, in 1828, a communication from Mr Alexander Macleod, residing in North Uist, respecting an embankment and the drainage of two lakes in that island. This communication, to the author of which a piece of plate was adjudged, it has been deemed expedient to print along with the above mentioned Essays.]

Essay I.—*By James Blaikie, Esq. Advocate, Aberdeen.*

The protection of the rich and valuable meadows which are generally found on the sides of rivers, and the preservation of the natural banks, must ever be objects of primary importance, because unless the floods and encroachments of rivers be effectually stayed by sufficient bulwarks raised for that purpose, any other improvement on lands, subject to such casualties, is incomplete, and comparatively of little moment. All such bulwarks, whether intended to prevent the flooding of the adjacent grounds, or to preserve the river

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banks, may be included under the general term of Embankment; and although the writer of the following observations cannot pretend to offer a regular, much less a scientific, essay on the subject, yet he trusts the object of the Highland Society may be as well attained, by an unassuming detail of the nature, expense, and effect of actual operations, and the practical inferences to be deduced from these, as by an imposing display of theoretical knowledge, which, however plausible, may not have been attempted in practice, and may possibly fail when carried into execution.

Indeed, it would be a Herculean task to attempt to lay down rules, or give directions, for raising the requisite structures in every situation. So many local impediments occur, so many unlooked for obstacles must be surmounted, and there are always so many circumstances to be attended to and provided for, that much must ever depend on the ingenuity and ability of the director, to whom, however, some general observations, and some description of similar operations having the same end in view, may not be wholly unacceptable.

Under this impression, the subsequent remarks will be chiefly confined to a report of the Embankments on the Don in Aberdeenshire, from the bridge near Inverury to the church of Dyce, a distance of about eight miles in a straight course, but nearer twelve, if the river be followed. In this space the whole fall does not exceed 40 feet; and in consequence of this very small declivity, and the winding nature of the course of the river, through a flat country, the floods, if not checked, would extend widely, and prove most destructive to the crops on the rich and extensive haughs on both sides, and the banks, if not carefully preserved, would be cut and carried away even by the action of the water in its ordinary state, and in an infinitely greater degree by the melted snow and ice in spring and winter.

The proprietors and tenants whose estates and farms are bounded by the Don, were therefore compelled, as the first step to permanent improvement, to raise embankments of

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different descriptions; and from these causes, such erections are more numerous and varied than could well be expected in so limited an extent.

In examining this part of the Don, an intelligent observer will immediately remark the benefit to be derived from straightening the course of a river, as much as situation and circumstances will admit, before attempting any operation in embanking: for, were a new course to be cut for the Don, from a point rather below its confluence with the Ury to the church of Dyce, a distance of less than eight miles in a straight line, but above eleven, with a fall of barely 37 feet, by its present windings, not only would a considerable quantity of ground, perhaps two hundred acres, at present occupied by these windings, be reclaimed and rendered productive, but as the river itself would flow without interruption, and by a much shorter course, its velocity would be increased, the risk of its overflowing in summer and autumn, or of the channel being choked, and the banks cut by the ice in winter, consequently diminished; and even liability to frost, the never-failing concomitant of standing or still-running water, be, in some degree, prevented.

In this particular instance, however, part of the lands on both sides is strictly entailed, and as there was (and unfortunately still is) from that cause, no prospect of this desirable improvement being carried into effect, the object of each proprietor has been confined to his own protection, without much regard to the injury which his operations might occasion to his neighbour's property; so that the necessity for some of the embankments may perhaps be traced to the previous erection of others on the opposite side. Be this, however, as it may, much industry has been exerted to repel the inroads of this river. Some of the banks are extremely simple, and formed at very small expense; others, again, are raised on scientific principles, and were executed at a high price.

The highest, which adjoins the bridge at Inverury, on the

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north side of the river, was formed by the Earl of Kintore in 1801. It prevents the Don from overflowing the adjacent haugh of upwards of ten acres of excellent soil, and from running into its old course about 600 yards above its confluence with the Ury. The extent of this embankment, which is slightly curved on the sides, is 380 yards, the average breadth of the base 20 feet, and its height 5. It is wholly composed of rich earth, neatly turfed on the sides, and was raised by the spade under contract, in the form shewn by the section No. 1, at an expense of 1s. 6d. per running yard, or L. 28, 10s. in whole. This embankment has afforded complete protection to the grounds lying within it, and, reckoning moderately, it has added a third to the value of the lands which it protects.

A short distance below, and on the same side of the river, is the Haugh of Kinkell, containing twenty-eight acres, and the Haugh of Thainston, consisting of ten acres; together thirty-eight acres of as good land as is to be found in the county. These haughs are protected by an embankment extending 530 yards on Kinkell, and 168 on Thainston, 13 feet at the base, 2 feet at the top, and 4 feet high, also composed of earth, completely turfed, and formed entirely by the spade, of the shape shewn in section No. 2, at an expense of 6d. per running yard, or L. 17, 5s. in whole.

On the adjoining farm of Ardmurdo, there is a third embankment continued on the neighbouring estate of Balbithan, extending 890 yards along Ardmurdo, and 185 along Balbithan. The natural banks rise higher here above the ordinary level of the river than a little way up, and consequently less banking is required; the height of the embankment being only $3\frac{1}{2}$ feet, the width at top 2 feet, and the base 12 feet, of the form shewn by section No. 3. This embankment is also of earth, and turfed, and was formed by the spade at 6d. per running or lineal yard, or L. 26 : 17 : 6. in whole; yet it protects twenty acres on Ardmurdo, and eight on Balbithan.

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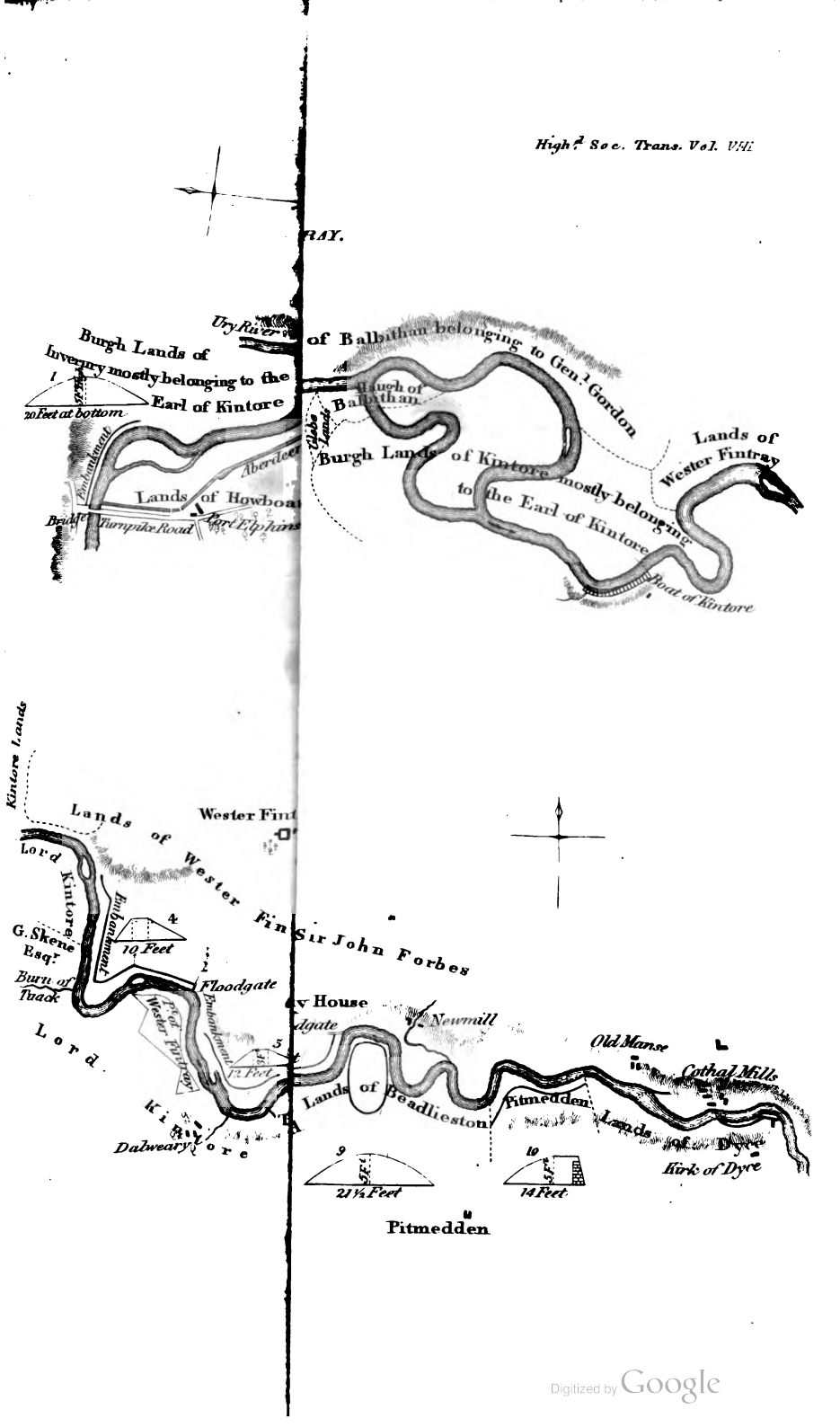

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The two last are more perpendicular to the land than to the river. They were executed by the tenants about twenty years since. No operation was necessary on the river banks, and, light as the expense was, it might perhaps have been still further reduced, and the work more perfectly executed by the plough instead of the spade. The soil, consisting of rich alluvial earth, to a considerable depth, afforded abundance of material for the operation of the plough, an implement which will, with great facility, raise a bank of earth to the height of 4½ feet, while the treading of the cattle employed in ploughing is of the greatest use in bringing the mould into a firm and compact body,—an effect which cannot be expected from the mere weight of the earth employed, and the beating it into shape with the spade.

The sketch of the Don, Plate I., which is annexed to this paper, will shew the relative local situations of these embankments, and of those to be afterwards described. On inspecting it, the importance of a new channel for the river for a short distance, compared with the extensive cut already alluded to, is quite apparent. Had such been formed from a point a little below the embankment on Balbithan, through the Haughs of Balbithan and Kintore, and part of Mr Skene's lands of Wester Fintray, the course of the river would have been shortened 1744 yards, or nearly a mile, the length of the new line being only 556 yards, and that of the present course 2300; but as the river runs part of the way in two grains or branches, the land gained would have been still greater in proportion, the old course occupying 19 acres, 2 roods and 19 falls, and the proposed new channel only 2 acres 1 rood and 23 falls. Besides, the operation on Lord Kintore's burgh lands of Kintore, to be immediately noticed, and at the Greenhaugh, would have been rendered unnecessary.

At the burgh of Kintore, the south bank of the river rises

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nearly 30 feet perpendicular above the ordinary surface of the water. The bank is composed chiefly of sand of a loose and friable nature, and was very easily undermined by the river, which runs directly against it. It was even broken down by the action of frost, and by the wind and rain beating upon it from the north. Indeed, so rapid and destructive was the encroachment here for the last five years, that upwards of two acres of ground were carried away, and had not the river been effectually repelled, it would certainly, in a few years, have cut its way through the burgh.

As the river was both deep and rapid at this place, it became necessary to construct cassoons to direct in some degree the current from the banks; and the opposite side being formed of a great accumulation of shingle, the direction of the stream against it could occasion no injury. These cassoons were formed of larch trees (for durability) four to six inches in diameter, of different forms and sizes, to fit the parts of the river in which they were placed. They were put together with strong wooden nails, and the bars were sufficiently close to retain stones of various sizes. They were placed in the river at convenient distances from each other, with the lower sides shaped to the slope of that particular part of the bed, so that the top might be as nearly level as possible, and then filled with stones to the weight of from four to eight tons in each; and the intermediate spaces between the cassoons were carefully made up with stones and brushwood to the surface of the water, to prevent undermining.

As the water generally rose in floods about 15 feet above the ordinary surface, it was considered prudent to causeway to this extent, which, after sloping the bank to an angle of sixty degrees, was accordingly done with large stones, firmly placed on their ends, in the most substantial manner. The rest, or upper part of the bank, was then sloped in a continuation of the same angle, and covered with turf, leav-

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ing a distance of 50 feet from its top to the bed of the river.

Since this work was completed, there has been no extraordinary flood or floating of ice to try its solidity and strength; but although the river runs with great rapidity and force against the face of the bank, it does not seem, after the experience of last winter, to have sustained the slightest damage, and a very little attention in repairing any trifling injury it may sustain by the winter floods, will insure its durability.

The extent of this bulwark is one hundred and sixty-two yards, and although upwards of one thousand tons of stones (carted nearly two miles, at an expense of at least L. 50) were consumed in erecting it, the whole expense, including the value of the timber used in constructing the cassoons, was only one hundred guineas, The plan and execution of this work are very much admired. It was begun and finished last summer; and it may be remarked, that the pasture of the slope amply compensates the loss of ground in forming it, as previously there was great danger in approaching the edge of the bank, and consequently the full use of the ground could not be obtained.

The banks of the Greenhaugh of Wester Fintray, a very short distance below, on the opposite side of the river, are also protected by cassoons constructed at a small expense. their form is oblong, from eight to ten feet in length, and Three to four in breadth, filled with small stones, and carefully placed in the bed of the river. As the banks are not high, nor the river either rapid or deep there, these appear, in the mean time, to answer very completely the purposes intended.

On the same property of Wester Fintray, but a little farther down the river, an embankment was raised by the present tenant, Mr Walker; the upper part above thirty years since, when embanking was very little understood in this neighbourhood, and the lower a few years ago. Its object was to protect the valuable haughs of that farm, containing

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about thirty-six acres; and, except in the floods of 1799 (the highest ever remembered, except those of 1768), it has succeeded completely. The two parts, as shewn in the sketch, measure together nearly 1500 yards. Both were raised by the spade, and are neatly turfed. The expence of the upper part, at the time it was executed, was 1s. per running yard, and that of the lower about 3d. more. The average of the base of the upper division is 10 feet; the medium height 4. The inside is nearly perpendicular, and the outside forms an angle of 45° to the river. The form will be best seen by referring to the section, No. 4.

To this embankment there are two objections. 1*st*, The height is not sufficient, for, in the year 1799, the river having risen much higher than it has done since 1768, overflowed the embankment, and left an immense weight of water inside; 2*d*, The form is inappropriate, for, when the river subsided, the land side, from being so perpendicular, did not present sufficient resistance to the weight and pressure of this quantity of water, which burst the bank, and occasioned a good deal of damage and expense. But although the base of this embankment is so much narrower, while the embankment itself is rather higher than those which have been noticed, it seems sufficiently strong to resist any river flood (the accident above mentioned being occasioned, not by want of strength, but by deficiency in height, and imperfection in form); and it would thence appear that the others are stronger, and consequently more expensive than there is occasion for (an error which should be carefully avoided), as there is no greater stress upon them than upon that on Wester Fintray. The lower part or division has nearly the same slope on both sides. The base is 12 feet, the width at top 3 feet, and the height also 3 feet, as shewn by the section, No. 5.

On the contiguous farm of Nether Suttie, Mr Skene of Skene, the proprietor, expended, about five years since, a large sum in forming a substantial embankment on a plan

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and under specifications made out by Mr Johnston, land-surveyor in Edinburgh; and he, at the same time, agreed to allow the tenant of the adjoining farm of Mill of Fintray, who held a liferent lease, full payment, at the expiry of his tack, for a similar embankment on that farm. The embankment along the river is 21 feet at bottom, 3 feet at top, and 6 feet high, and extends 1000 yards on Nether Suttie, and 950 on Mill of Fintray; but, as there is a considerable burn on the march betwixt these two farms, which discharges too much water to admit of its being conveyed through the embankment by a flood-valve, it became necessary to protect both sides of the burn by a bank raised to the same level with that along the river. This supplementary embankment is 10 feet wide at the base, and 6 feet high, at an average; and, being carried backwards about 800 yards on each side, there are consequently upwards of 1600 yards lineal of banking required to defend the haughs from the overflowing of the burn. As another large burn also formed the march betwixt Mill of Fintray and the lands of Fintray, another embankment was required on that side. It is 295 yards long, the average height 7 feet, the base 23 feet, and the top 2 feet.

The whole is composed of earth, and was formed by the spade. The slope is the same around, being at an angle of 45° to the land, and about half that angle to the river. The expense varied from 3d. to 6d. per cubic yard, according to the distance which the materials required to be carried, and amounted, in whole, to upwards of L. 320 Sterling, affording, for that sum, complete protection to about eighty acres of excellent ground.

The river banks on the Mill of Fintray part of this embankment, were also very liable to be cut and carried away, and they are likewise protected by cassoons filled with stones, in the same manner as at the Greenhaugh. The water which supplies the thrashing-mill of Mill of Fintray, runs within

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the embankment, but does no damage, even when the river is flooded, as the channel through which it is conveyed has been deepened and widened so as to contain a considerable quantity of water, and it passes off, when the river is not particularly high, by an ordinary flood-valve.

On the opposite side of the river, Mr Walker has formed a bank 250 yards long, with a base of 12 feet, 7 feet high in some places, in others about 3, according to the level of the ground, which prevents the flooding of about 6 acres on that side; but, as the river banks are not protected, there is every probability of the embankment being thrown down, unless measures are taken to secure them. This embankment was also raised by the spade, and turfed, at an expense of 6d. per running yard, or L. 12, 10s. in all.

Farther down the river, and opposite to Mill of Fintray, is the embankment of Kinaldie, which was executed in 1812, and deserves particular notice. Its length is about 1000 yards, and its dimensions the same as that on Nether Suttie and Mill of Fintray. The mode of erection, however, was different, and its form will be seen by section No. 7.

There were several small hills of sand in the neighbourhood of the Haugh of Kinaldie, which the proprietor wished to remove; and, conceiving that they might be usefully applied in embanking his haugh, he commenced the operation by lining out the base, and removing the turf and a considerable depth of earth from it. The sand was then carted from the hills, and deposited in the line of the base, the loaded carts always passing along the sand which had been previously laid down, in order to firm and consolidate the embankment, which, when brought to the proper size and shape, was covered to the depth of 18 inches with the earth and turf which had been previously removed from the base, and sown out with grass seeds. This embankment has stood uncommonly well. It protects from the ravages of the river about 40 acres of very fine soil; and the proprietor states, that the pas-

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ture is of much more value than the land was which the embankment occupies. But the river was not the only enemy to be guarded against: The burn of Kinaldie ran, on the east, in a crooked and irregular course; and, being very easily swelled, it also was apt to flood the haugh from that side.

To remedy this, the burn was straightened and widened, the sides built up with stones, and another smaller embankment, of nearly 600 yards, composed of the stuff thrown out of the burn, raised along its west side, and being faced with stone in the inside to the height of 4 feet, a very complete fence was thereby formed in the haugh. The greater part of the embankment to the river was executed at 5d., and the remainder, where the carriage was short, at 3d. per cubic yard, amounting to L. 163 : 17 : 6 in whole. That to the burn, including the straightening of the burn, and facing the inside of the embankment, cost, as nearly as can be ascertained, L. 120, or 4s. per running yard.

Passing over, again, to the north side of the river, we find an extensive and well-constructed embankment upon the Fintray estate, which was begun and completed in the summer of 1818. Its length is upwards of a mile, the average height 6 feet, the base 23 feet, and the top 18 inches, with nearly the same slope on each side, but rather longer to the river, as shewn by section No. 8.

Of this, fully 1500 yards were raised principally by the plough, and the remaining 200 yards by the spade. The levels were taken by an accurate instrument, 2 feet above the highest flood-mark on record. The turf was pared off the base, and preserved for covering the outside of the bank; and the direction of the centre of the base was marked by small pins, 2 feet apart. The operation was begun by four furrows of a two-horse plough around the line of pins, followed up by four furrows of a large plough, with a long wooden mould-board, drawn by four horses, the beam being held down

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by a labourer, so that the plough might penetrate as deep as the horses could draw it.

By this means, two very large furrows were thrown upon the top of the four laid over by the two horses, and this ploughing with the four horse plough was repeated until the bank was raised to nearly 5 feet. To give the bank the proper form, complete the additional foot of height, and bring any hollows or inequalities to an exact level, four men were employed on each side. They began at the top, and the earth being all within spade reach, and having been reduced to a fine workable mould by the plough, they finished a very considerable extent in a day. The outside of the bank was all thoroughly turfed by contract, at 4d. per running ell; and the inside sown with a mixture of rye-grass, red and white clover, and rib-grass seeds. The remaining 200 hundred yards were raised by the spade at 3d. per cubic yard, as nothing could be done by the plough at that place from deficiency of mould, the earth requiring to be collected in carts and wheel-barrows. Besides, the height was too great for the plough to operate with advantage. The base, which is level with the ordinary surface of the river, is 50 feet, the width at top 18 inches, and the height 13 feet; and it was surfaced in the same way as the part which was formed by the plough.

On the outside of the embankment another operation was performed, to prevent the river from undermining the banks. In as dry a season as possible, and when the river was in its lowest state, about 200 ells in length of the bank, where it was about 8 feet above, and from 6 to 7 below the surface of the water, making in whole a perpendicular height of fully 14 feet, were ploughed down. It was brought to an angle of 45°, forming a long slope from the top of the bank to the bottom of the river, the sharp edge of the bank having been reduced previous to commencing with the plough. A course of stones was then laid along the angle at the bottom of the

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river, and additional stones were thrown in, which were regulated by a large rake or creeper, until they reached the surface of the water. Other stones were then laid by the hand, in the manner of a rough causeway, 3 feet above the surface. No stones larger than a man could easily lift into a cart were made use of, because large stones would have been difficult to manage in sending down the slope, and they would run too far into the river. Large stones are also apt to occasion eddies, and cause the water to cut away the lower part of the banks. The surface was neatly and firmly laid with green turf, which finished the operation. The expense of sloping the sharp edge of the bank with the spade, laying the stones, and turfing, was 9d. per running yard, where the banks were 8 feet above the surface, and the current rapid, and 6½d. where they were 6 feet, and the current not so rapid.

The extent of land protected by these operations is above 100 acres; the whole expense of the part done by the plough was L. 70, of that done by the spade L. 60, and the protection of the river bank, including ploughing and carriage of stones, about L. 20, making L. 150 in whole.

So very sensible were the tenantry on this estate of the advantage to be derived from embanking their haughs, that they readily agreed to give an additional rent of 5s. for each acre which the embankment might protect.

At a short distance below Kinaldie, is an embankment on Beedlieston, surrounding a piece of land of 20 acres. As the grounds on the west are low, boggy, and unimproved, and of little or no value, the tenant thought that the most economical, as well as the most effectual mode of protection, would be to surround the field, in place of extending the embankment along the river banks, and this he has performed by the plough in a very substantial and effectual manner. The circumference in whole is upwards of 1300 yards, the base 21½ feet, and the height 5. The slope, or rather curvature, is the same on both sides, and the expense 4d. per running yard.

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The only other erection within the limits of this report, is that at Pitmedden, below Beedlieston. Its length is 950 yards, its base 14 feet, and its height 5 feet. It is faced with stone in the inside, to the height of 4 feet, and thereby answers as a fence on that side, and is consequently nearly perpendicular to the land. To the river the slope is considerable. The breadth of the top is 5 feet, and a quantity of willows have been stuck in nearly at the surface of the water. The expense of this embankment may be reckoned at 10d. per lineal yard, exclusive of the facing with stone, which was done at a subsequent period, and cost about 5d. per ell; and about 30 acres of ground are effectually protected by it. Nearly 500 yards of the river bank, opposite to the lower end of this embankment, are sloped to the bed of the river, and covered to the surface of the water with stones loosely thrown in until they find their level. This very simple mode of securing the river bank, has, in this case, succeeded, as the current is not very rapid, and has not displaced them.

A little below this place, too, a very important improvement was projected some years since, which might be executed at a comparatively small expense. Above the part of the river alluded to, the fall is so small as to be hardly perceptible; below, it is pretty considerable; and, therefore, by simply deepening and sloping the bed of the river, for a little distance at that place, and equalizing the fall, if it may be so expressed, the velocity would be so much increased, that the river would be contained within its banks, even in pretty high floods.

In addition to the structures above mentioned, there is a bulwark lately erected on the south side near the river mouth, by the Fishing Proprietors on the lower part of the Don, which deserves particular notice, not only for its importance to the fishing, but also for the substantial and ingenious manner in which it is constructed, and as affording a model,

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which may hereafter be found worthy of imitation, in raising embankments upon the beach, or even against the sea.

The object of this bulwark is to direct and retain the river in a straight course through the beach to the sea, and keep its mouth either from shifting, or the water from spreading along the sands, which often happened, particularly after easterly storms, to such an extent as not to leave sufficient water, at any one place, to swim the salmon from the sea into the river.

About 60 or 70 years ago, a smaller bulwark or dike, as it was termed, was built under the direction of Dr Gregory, (then a Professor in King's College), the grandfather of the late Dr James Gregory of Edinburgh, immediately west of the present erection, for the purpose of staying the river from running to the southward, and reaching the sea nearly a mile south of its present estuary. It completely succeeded, and this success encouraged the Heritors of the Fishings to try the effect of the present operation, which is in fact a continuation, on a larger and more substantial scale (as its more exposed situation requires), of Dr Gregory's dike.

The new work was commenced in May 1822, and that season it was extended towards the sea about 50 yards, besides repairing and strengthening 70 yards of the old dike. In 1823, 100 yards more were finished, and in the present year, it has been carried 100 yards further. It was built in the following manner: Two lines of piles, 14 feet in length, were driven into the sand to the depth of 6 feet in general, but deeper where it was thought necessary; at a distance of 1½ foot between the lines, and 6 inches between the piles. The space between the lines was then packed with furze, as hard as possible, to prevent the sand from the beach to the south blowing through the stones into the river; after which stones of different sizes, from 50 pounds to half a ton weight, were precipitated promiscuously, from a lighter, or punt, into the river, on the north side of the poles. As these sunk into

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the sands, others were added until they reached the tops of the piles, by which time they generally assumed a slope of 45 degrees. The furze also required additions from time to time, as it sunk down and became consolidated, and it was secured by stones placed on the top, and these wedged tightly between the heads of the piles. The 100 yards which were last finished, being more exposed to the violence of the sea than the work of the two preceding years, it was thought proper to drive three lines of piles in place of two. The extreme point terminates in a slope of 45 degrees to the sea, and is well secured by piles, and stones firmly wedged between them. The poles, or piles, made use of were furnished from the thinnings of the woods of Kintore. They were from 4 to 5 inches in diameter, perfectly straight, and cost 1s. each. The stones were furnished by contract, at 2s. 3d. per ton, all deliverable at the Bridge of Don (about half a mile above the river mouth), from which they were conveyed down the river in a punt.

The expense of the part finished in 1822 was	£ 239	10	9
In 1823, ...	360	18	0
And, in 1824, . . .	421	12	6
In whole,	L. 1022	1	3

which, after deducting the expense of repairing the old dike, would leave L. 3, 10s. as the price of a lineal yard of the new work. One-half of the expense was incurred in the purchase of materials, and the other in payment of the labourers who were employed. The annexed section will give an idea of its form. It has stood uncommonly well, and to the south-west the sand has already blown nearly to a level with the top, while the river has run quite close to the north side, and preserved a free channel into the sea, affording abundance of water at all times of tide for the fish to enter, and completely answering every purpose for which it was intended.

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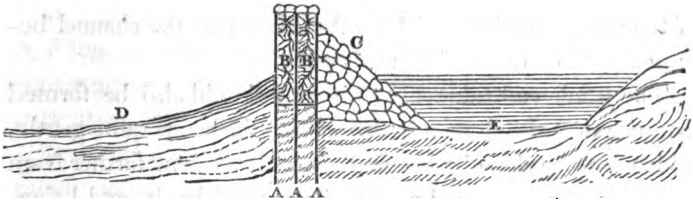
Section.



AAA Piles, driven 6 feet into the sand.

BB Spaces, of 18 inches, betwixt the lines of piles, filled with furz and stones wedged on the top betwixt the piles.

C Stones, from 50 pounds to half a ton, precipitated from a punt, and additional stones thrown in as the others sunk, until they formed an angle of nearly 45 degrees.

D Sandy beach on the south side, the sand gradually forming a bank against the south side of the bulwark, being prevented from penetrating by the furze.

E The bed of the river, now running in one close stream to the sea.

From the details already given of actual operations, and an attentive consideration of the subject, the following practical inferences may be drawn.

In forming embankments, the proprietors on both sides of the river, if it can possibly be so arranged, should understand each other, and act in concert, so that one operation may not counteract another, and that the effect of the whole may be equal and uniform; for if a part project, or jut out, that part is not only exposed to risk by the water working on its angles, but it also exposes the neighbouring grounds to danger, by narrowing the channel, and turning the stream against the opposite bank.

In like manner, proprietors ought to ascertain whether or not the course of the river proposed to be embanked can be straightened, so as to shorten the distance between given points, and present as few windings, angles, and obstructions to the

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action of the water as possible, or deepened at any particular spot, so as to equalize the fall, thereby increasing the velocity of the stream, and diminishing the danger of the channel being gorged, or the banks overflowed.

The whole embankments on a river should also be formed as much as possible on a line, and with the bends quite gentle, which is to be done by keeping the embankment farther from the river in all convex lines of the natural bank, and bringing it nearer where the bank is concave, as this will diminish the action of the water on the embankments, and consequently add to their duration.

The direction and the velocity of the stream at all the different points should be carefully studied, that the strength of the embankment may be calculated accordingly, and the dimensions either increased or diminished according to the resistance which it will have to present.

As a river will rise higher when embanked than when at liberty to spread over the adjoining grounds, it is more difficult than is generally imagined to find the proper level to which an embankment ought to be raised, to insure safety on the one hand, and avoid unnecessary expense on the other.

The only secure method is to ascertain the utmost rise which *has* taken place in some gorge, where the river cannot spread, and to raise the embankment fully two feet higher than this point; for if the embankment is even of moderate dimensions, it will sink fully a foot by its own weight before it becomes quite compact and firm, and another foot is required to guard against any accident on the top. By inattention to this rule, the embankment at Wester Fintray was overflowed, and burst by the weight and pressure of water which thus gained admittance.

The embankment should be placed at some distance from the river, not only to admit of materials being carried along its outside for repairing the river's banks when cut or da-

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maged, but also to form a larger and wider channel for the river when flooded.

If the embankments be raised at only half the breadth of the stream from the natural banks, the channel will be doubled; the swollen water will be kept from rising in proportion, having double extent of space to flow in; and, consequently, a lower level and a narrower base will be sufficient for the embankment.

The same rules apply to the fencing of burns or brooks which discharge themselves into rivers, particularly at the mouth, where the two lines of embankment should be made considerably less acute than the natural sides of the burn, and finished off in a segment of a circle, although at the expense of a piece of ground being left out on each side; and the direction of the burn itself should be rendered more sloping, so as to enter the river less athwart to its direction than before. But leaving out even a considerable piece of ground is, in reality, no loss, for what is so detached affords excellent pasture, and, at particular times, and in particular seasons, is frequently more valuable than any other part of the estate.

It is, therefore, very mistaken economy, and very dangerous policy, to place an embankment close to the river; and in the view of the full benefit of pasturage being obtained, and of the utility and strength of the embankment being secured, it should perhaps have the same, or nearly the same, slope on both sides, the angle being regulated by the pressure which it may have to sustain, but in no case should the angle exceed 45 degrees. Such a slope would admit of cattle pasturing all over the bank, without danger of their breaking it down, and should it happen, by any chance, to be overflowed, the inside will afford equal resistance to the weight and pressure of the water as the outside, and thereby do away with the risk of its being damaged or burst.

If the embankment be also intended to serve as a fence, this observation will not apply. In that case, the inside of

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the bank must be cut perpendicular to the requisite height, and faced with stones, in the mode adopted at Kinaldie and Pitmedden; but neither hedges nor trees ought to be planted on embankments, because, when they are shaken in high winds, the earth is loosened at their roots; water then obtains admission, and is apt to swell and burst the bank; and even willows, planted on the slope to the river, are not to be recommended, as they catch whatever is floated down the stream, and either occasion a gorge, or are torn out by the roots, and so materially injure what they are meant to protect.

If there be sufficiency of mould, as is generally the case in haughs where embankments are required, and the height does not exceed four and a half feet, the bank may be raised both expeditiously and economically by the plough; and even should a greater elevation be necessary, the additional height can be given by the spade, at a smaller expence than raising the whole by the hand would cost. In either mode, the turf of the base should be carefully raised and preserved, for covering the outside of the bank. If carting or wheeling any part of the materials is required, the carts and wheelbarrows should pass along the embankment, to render it compact, and assist in consolidating the earth; and when formed into the requisite shape, it should be beat by the spade into an even surface; the turf neatly laid on the outside, as far as it will cover, and the remainder sown with a proper mixture of grass-seeds, which will complete the operation.

To allow the bank to consolidate, and the grass to establish itself before the autumn or winter floods, all embankments should be raised as early in the season as possible; and all operations for protecting the natural banks ought to be carried on during summer, when the river is in its lowest state.

In all embankments there should be an ordinary flood-

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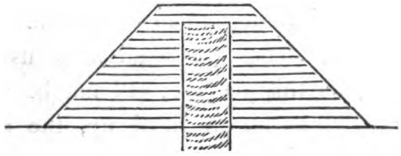
valve, to let off any rain-water, springs, or contents of drains, which may accumulate within; but the eye or sewer by which the water is conveyed through the bank, should be of stone, and not of wood, because the latter soon wastes in such situations, and the embankment falls down, and chokes the passage, occasioning much trouble and expense in repairing the damage, and re-opening the sewer. If there are burns or considerable quantities of water within the embankment, which cannot be discharged by a flood-valve, they must either be separately embanked along the sides, like the March Burn betwixt Nether Suttie and Mill of Fintray, or, if more convenient and economical, carried into the river by a new channel, at some other point wholly clear of the embankment.

In most situations, embankments are raised from the earth or mould in the vicinity; but all such are liable to great danger from holes made by rats and other small animals, which frequently penetrate through the bank; and when running water gets access, and is enabled to pass through any aperture, however small, it continues to enlarge the orifice until the bank is seriously injured. For this reason, unremitting attention ought to be paid to fill up such holes as soon as they are discovered, and to keep the turfed surface always whole, and in good order; and it would certainly be an improvement on, and contribute much to the security of embankments, were two or three feet in the centre composed of gravel and sand, in the annexed form.



The sand or gravel would give way, and fall down as soon as it was touched, and the animal, finding itself disappointed in getting through the stratum, would soon desist. Indeed the em-

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bankment at Kinaldie, composed solely of sand, and merely coated with a sufficiency of earth to produce grass, appears to be as compact and strong as any on the river; and the materials for forming a similar one are in general easily procured, and may, in many cases, be supplied by the river itself.

The preferable mode of securing the natural banks of rivers, seems to be to slope them at the proper angle for the particular situation, and protect the bottom of the bank with stones, facing it up with the same material, to 3 or 4 feet above the ordinary surface of the water, and then with turf to the top. Neither piers, nor cassoons or cradles, afford so effectual or economical protection; they are all expensive, and the latter are neither permanent nor durable. They are all apt to occasion eddies, to check the water too abruptly, and direct it against the opposite bank. If the banks are high, the plough may be used with much propriety, to reduce them to a slope of about 45 degrees; if low, the work may be performed as economically by the spade. When reduced to that state, stones of a moderate size should be thrown in, and a foundation formed in the bed of the river, after the manner of a rough causeway, which may easily be done by what is provincially termed a Creeper (a strong rake with two prongs); the bank is then to be faced with stones, to the height above mentioned, and if small stones or pebbles can be procured, the interstices of the large stones should be closely filled, by throwing quantities of these promiscuously on the surface, and raking them well down. Even the expense of breaking stones (as small as is usually done for turnpike roads) for this purpose, will not be misapplied, because, when the vacancies are filled up, the mud and slime soon form the whole into a solid and compact body, which it is very difficult to damage or displace.

In conclusion, it may be here observed, that, in many situations, great benefit would be derived both by individuals

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and by the country, were powers vested in the Judge Ordinary to cause the channels of rivers to be straightened, and make the necessary compensation either in land or in money to the proprietors when grounds may be cut off.

If, in addition to such powers, the proprietors of entailed estates were authorised to burden the succeeding heirs with a proportion of the expense of making such straights, and of forming embankments, the melancholy spectacles of cattle, sheep, and corn floating down our rivers, which are so frequently presented during autumn floods, would become more rare, and the farmer would proceed with full confidence in the improvement and correct cultivation of the grounds along the river banks, where the finest and most productive land is in general to be found, but of which the full benefit cannot be obtained, unless complete protection be afforded by embankments.

Essay II.—*By the Rev.* Gavin Hamilton, *Minister of Ashkirk.*

This essay contains some judicious remarks on the importance of embankments, the great advantages that would arise from them in many parts of the country, and the evils of constructing them in an imperfect manner. Mr Hamilton has also collected much valuable information on the subject, from various works of agriculture, to which, however, we must here merely refer, namely:

1*st*, Observations on Embankments, by Robert Beatson of Kilvin, Esq., late of the Royal Engineers, published in the 2d vol. of Communications to the Board of Agriculture; also in the same volume, an interesting account of the drainage and embankment of Marasion Marsh in Cornwall, and of an embankment at Pembrey in Caernarvonshire:

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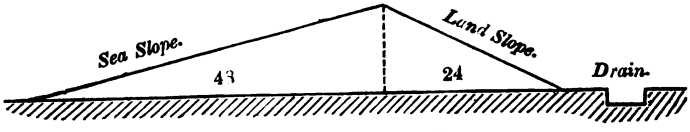
2d, The 6th volume of the same work, which contains, at page 148, a short notice of embankments on the Rhine at Strasburgh, by means of fascines, which was also successfully practised in the river Eden in Cumberland;—at page 150, an account of an extensive embankment in Caernarvonshire, by W. A. Maddocks, Esq., in 1805, by which upwards of 1000 acres have been gained from the estuary, which divides the county of Caernarvon from that of Merioneth *, at an expense of L. 2800, while the lands were afterwards let at from 30s. to 50s. per acre;—at page 252, another by Lord Boringdon of Saltrom, near Plymouth, in 1806, by which 175 acres were reclaimed, the expense was between L. 9000 and L. 10,000, and the value of the lands at that time L. 27,000 or L. 28,000; height of the embankment 16 feet wide, of the base 91 feet; front slope covered with limestone paving; back slope sown with grass seeds;—at page 253, another by Admiral Bentinck, reclaiming 180 acres of salt marsh, at an expense of L. 4000, and yielding a clear profit of L. 560 a year; the length of the bank was rather more than $1\frac{1}{2}$ mile, height 12 feet, and the form as in the annexed section.



72 *feet.*

* The same gentleman, in 1807, commenced a still more extensive scheme of embankment, by which 4000 acres would have been reclaimed, by an embankment extending 2 miles across the estuary of the Glasslyn, by which, also the counties of Merioneth and Cardigan would have been united, and a shorter and improved line of road rendered practicable, between London and Dublin, and between Dublin and Bath. This great work, of which the expense was estimated at L. 20,000, was abandoned when very near its completion, by pecuniary difficulties into which its projector had unfortunately fallen. See Supplement to Encyclopædia Britannica, art. Embankment.

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3d, Farmer's Magazine, vol 3d, containing at page 117, an account of an embankment of carse land, 1400 yards in length, on the farm of Netherton of Grange, near Findhorn in Nairnshire;—and, at page 330, an account of another, 1400 yards in length, on Lord Galloway's estate in Wigton, reclaiming upwards of 100 acres, and at an expence not exceeding L. 90.

4th, At page 273, an account of the embankments on the Frith of Forth, by which upwards of 600 acres have been recovered at different times prior to 1810, letting at L. 4, 4s. per acre. "With regard to the manner in which these embankments are constructed, the reporter finds that a year or more before the bank is built, fascines of brushwood are fixed down in the clay, by strong palisades, in the line in which the embankment is to be conducted, and over which it is afterwards actually built. By this line of fascines, the mud and floating vegetables, which would otherwise be washed away, are arrested, and a considerable addition made to the soil.

"The embankment is made of mud or earth, faced on the side that presents itself to the sea, with large stones, which are procured from the quarry of Longannar, on the opposite side of the firth. The strongest of these embankments are 40 feet wide at the bottom, and 12 feet high, having a slope of 2 feet to every foot in height. In some situations, a bank of 7 or 8 feet in height is found to be sufficient. A dike of this kind will defend from the sea for ages; and is kept in repair at an expense so trifling, that tenants have no objection to take the burden upon themselves."

At page 277, or else Statistical Account of Scotland, vol. xviii. p. 220, an account of the drainage and embankment of a large tract of land in Kilsyth, on the banks of the Kelvin, by Sir Archibald Edmonstone of Duntreath, Bart.; the work being planned by Mr Whitworth, engineer, then in the business of the Forth and Clyde Canal.

5th, Souter's Survey of Banffshire, page 249, containing a

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short account of the embankments on the Spey at Gordon Castle.

6th, General Report of the Agriculture of Scotland, vol ii. Art. xiii. on Embankments, by Mr Johnstone, land-surveyor, containing an abstract of the information in the above works, with many judicious observations, and useful practical remarks, well deserving of attention, for the author's experience in actual operations.

7th, To these we may add, Encyclopædia Britannica in Supplement, Art. *Embankment.*

ESSAY III.—*By Mr* JOSEPH UDNEY, *Land-surveyor, Moffat.*

THIS essay contains the result of the author's observations on several embankments with which he had occasion to become acquainted in the course of his business, together with various remarks on this, as well as on other subjects.

"There was a large embankment," he says, "made about the year 1774, along the south side of the Firth of Forth, to the west of the sea-port of Borroustounness, along the north side of the Carse of Kinniel. This embankment was made for the purpose of saving ground from the sea, not for that of gaining any. It consisted of earth, 25 feet wide at the base, and was carried up with a level on each side to the height of 9 feet, leaving a width of 8 feet at the top, so that one could walk along the top of the bank. The slope next the sea was faced with freestone. The expense was L. 2, 2s. per running rood, of 19 feet. This embankment has withstood the violence of the sea for 50 years, and still repels the highest spring-tides. It runs in a curved line, from north-east to south-west, parallel to the Firth. The whole length of the embankment being nearly 1½ miles, the total expense, at the rate of L. 2, 2s. per rood, was L. 873 Sterling. The embankment saves from the violence of the sea about 450 acres of carse

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land, at present rented at L. 4, 4s. Sterling per acre of yearly rent."

He is a great advocate for the employment of wood in the construction of embankments. But it is only in particular cases, such as he mentions, where this can be used with advantage, and even these embankments on the Firth, it appears by the Stirlingshire report already quoted, are generally faced with stones on the sea side.

"I shall now show," he says, "the manner in which the fir wood is to be prepared for the purpose of embanking. Supposing the tree to measure 18 inches in diameter at the lower end, and to be 28 feet long; let it be divided into four parts as to length, and let the lower division be sawn or split into six stakes, the second into four, the third into two, the upper division being left uncut. In this manner the tree will produce thirteen stakes. Larger trees will yield more, and smaller trees less. The stakes, however, should all be seven feet long, and nearly of the same girth; one end of each to be a little sharpened, that it may easily go down into the mud.

"The boundary of the ground to be taken in is first to be marked off. For this purpose, the work people should carry down a few small poles, placing a pole at each end of the first line nearest to the low-water mark, and running parallel to it, whether in a straight or curved direction. A few poles may then be placed between the end poles, in the course of the line.

"Let it be supposed that all the stakes are lying upon the shore, in readiness to be put into boats. When the tide begins to go out, the work people get into the boats, which are loaded with stakes, taking wooden mallets with them. So soon as the boats arrive at the end of the line marked out, they begin to run along the line, throwing out the stakes with their sharp ends into the mud, under the water, at intervals of about 4 feet. When the tide passes the line, the boats

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rest upon the mud, and the people get out to fix the stakes, driving them in so as to leave only 3 feet projecting. All this must be done quickly, there being only six hours between the departure and return of the tide. When it returns, the people get into the boats again, and, landing, reload the boats for next day's tide, the night tides not answering so well. When the first line of stakes is completed, they must, in like manner, carry out the branches of the fir trees, and warp the projecting parts of the stakes from one end of the line to the other, observing not to warp too closely, because the spring-tides and high winds wash the mud both through and over the line of stakes and warping, so that it may be expected that the first line will be filled up to the height of 3 feet, within the space of twelve months. In this manner, one line will be filled up each year, until the bank is raised to the level of the land upon the shore; and it must be observed that each line of the embankment must just be 4 feet distant from the other, until the embankment is brought to the height wanted.

"I may here refer to an embankment made for gaining land from the Firth of Forth, by the late Lord Dundas of West Carse, who, about the year 1784, embanked 200 acres from the Firth, and added them to the east end of his lands in the parish of Bothkenner, in the county of Stirling. These 200 acres were gained in the space of three years, as only three lines of stakes and warping were required, the embankment having only been raised to the height of 9 feet. The fourth year, his Lordship ordered the whole to be sown with rape-seed. It produced a pretty good crop, which was sold to the holders of the oil-mills of Glasgow, for rape-seed oil. The fifth year I measured the 200 acres, and divided them into three or four carse farms. Farm-houses were built upon them, and they were set in lease at L. 4 Sterling of yearly rent per acre."

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The expense of this embankment, Mr Udney says, the factor on the estate told him did not exceed L. 200. "The whole operation of embanking and gaining ground by stakes and warpings of common fir, is so simple and effectual, that his Lordship's tenants, when their farms happen to be along the Firth, take in, at their own expense, more or less land yearly. As fir trees are so plentiful, this method of gaining land is incomparably less expensive than any other."

The author concludes his essay by observing, that through the greater part of his lifetime, he has never seen any embankments equal to those made by fir trees, with their top branches for warping. And as the land thus gained is of the best quality, he earnestly recommends the gaining of more along our firths and rivers by these embankments.

ACCOUNT OF THE DRAINAGE OF LOCHMORE AND LOCH SCOLPIG, AND OF THE EMBANKMENT AT GARRIDU, IN THE ISLAND OF NORTH UIST. *By* ALEXANDER MACLEOD, *Esq. Surgeon, North Uist.*

I. LOCHMORE.

THIS lake was situated in the Island of Boreray, North Uist. It was bounded on the north side by high ground, on the east by sandy hillocks, on the south by rising ground, and on the west, where the outlet was cut, by a rocky beach, which was about ten feet above the surface of the lake.

On sounding the lake, and taking the level, it was found that the bottom of it (which was firm) was only two and a half feet above low water-mark; and the force of the Atlantic wave, to which the beach was fully exposed, was considered an unsurmountable obstacle to the constructing of any flood-gate that would effectually resist the force of the sea at such

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a low level. Being, however, pretty certain of the plans I had formed to surmount these difficulties, I determined on putting them in execution, which I did as follows.

The first part of the operation was to cut the principal drain or outlet through the rock or beach, which required a great deal of blasting, and, for the most part, could only be carried on while the tide had receded. The length of the outlet is 304 feet, and, when completed, I had the satisfaction to find that in a few days all the water had gone off, leaving the bottom of the lake quite dry and hard; as the weather was favourable and the sea calm, a simple flood-gate, placed in the inner end of the outlet, prevented the ingress of the sea for the time.

The next step was to make a covered drain three and a half feet square from low water to high water mark, and which was filled up with stones the same as a rumbling-drain; this being done, all the rubbish of stone about the place was thrown over the drain, so as to make it have the same slope with the surrounding beach,—as it was found that at high water a considerable oozing of the sea through the beach had taken place, and that, with stormy weather, the waves dashed over the beach into the drained lake with such force, as to throw, more than once, logs of timber clean over the beach. To overcome this, I made an earthen mound or embankment five and a half feet high, forty feet within the beach; and on this mound the flood-gate was put in a place where it was perfectly secure, as the beach broke the force of the waves, and the quantity coming through the drain comes up very slowly to the mound and flood-gate. In this manner every obstacle was removed, and the lake made completely dry. The water coming from the surrounding high ground was let off in the ordinary way by small drains leading to the outlet.

The bottom of this lake is composed of fine mould, being a mixture of alluvial earth and sand, which is very produc-

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tive, and has been in tillage for the last six years. There was no account kept of the produce of each year; but I may state, that, last year, 62 bolls of barley and 104 bolls of potatoes were raised on part of the ground. The rest of it was under fiorin-grass which was planted, and proved very productive.

The extent of ground gained is forty-seven Scots acres. The expense of draining was L. 125 Sterling, which was compensated by less than two years' crop.

II. LOCH SCOLPIG.

This lake was situated between the farms of Kilphedir and Scolpig, about the centre of the west coast of North Uist. Its situation and boundaries, as also the exposure of the drain or outlet to the Atlantic Ocean, is so similar to that of Lochmore, that it is deemed unnecessary to give a detailed description of them; and the plan of effecting the draining corresponds so nearly also, that a recapitulation is unnecessary. The length of the outlet from this lake is 510 feet, and it also required a good deal of blasting. As there was a considerable run of water coming into the lake, a drain, fourteen feet wide, and five feet deep, was carried through the centre of the ground, after the water was let off, which keeps it at all times dry.

The ground recovered is a fine loamy mould, from three to six feet deep. The extent is forty-two Scots acres. The expense of draining was L. 115.

Soon after the water was let off, fiorin-grass began to spring up spontaneously almost over the whole of the drained space, but it being in some places thin, about a fourth of the ground was planted with fiorin. This turned out well, and a fair crop was cut down last harvest. The ground is now fit for raising barley or any other crop; but as the fiorin is so promising, it is intended to leave it under that crop for some years.

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III. EMBANKMENT AT GARRIDU, IN THE ISLAND OF NORTH UIST.

The lands recovered by means of this embankment were covered by the sea with every tide at high water; the sea came in on one side from the westward, and here the embankment is much exposed to the Atlantic. On the other side, the sea came in from the eastward, where the bank is not quite so much exposed. The embankment was formed by merely heaping up the sand, of which the ground recovered is composed; and this was done first with shovels, and afterwards with wheelbarrows, to bring it to the necessary height. As the tide interfered twice in the twenty-four hours, and as the work could only be carried on when the tide receded, each day's work was completed to the necessary height before it was left off; and to prevent the tide from carrying off the sand from the exposed part of the work, bundles of heather were placed against the face of the embankment, kept down by a parcel of loose stones, which answered the purpose effectually.

The embankment being thus far completed across the bay, the next step was to cover the slope of it (which was very gradual) with alternate layers of heath and mud, which were beat down with wooden mallets: this done, the slope was planted with a stringy sort of fiorin, which grows on marshes; and this covering secured the bank from the action of the wind and waves.

This simple embankment has stood firm for the last four years, and is daily getting stronger—from this circumstance, that the wind at low water, and the waves at high water, force the sand against the embankment, where, by its resistance, it is retained.

The length of the different parts of the embankment taken together is 670 feet, and the mean height 6 feet; the breadth at the base is 55 feet, and it tapers off to 10 feet at the top.

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The expense of the embankment, including a small flood-gate, was only L. 24. The extent of land recovered is 39 Scots acres. It is composed of fine shelly sand (100 parts of the sand contain 75 parts of pure lime). The greatest part of the land recovered has been in cultivation for the last three years, and produced excellent crops of barley, by merely giving it a top-dressing of moss, with which the place is surrounded.

I may here state, that there are several hundred acres of this kind in the Long Island, which by this simple plan might be easily regained, and which would afford subsistence to the greatest part of the redundant population on that island.

Extent of Land regained.

1. Lochmore, ...	47·124 acres.
2. Loch Scolpig, ...	42·300
3. Garridu, ...	39·982
Total extent in Scots acres,...	129·406

The flood-gates alluded to are made on the simplest principle. A square box of wood, wide enough to let through the back water, is fixed in the mound; to the outer or sea side of the box, a lid is made to fit close, which hangs on two hinges on the upper edge of the box, connecting it to the lid. This simple flood-gate answers the purpose well, and does not readily get out of order.

EDINBURGH,
December 8. 1828.

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In conclusion, the following remarks are offered upon this important subject.—Most authors begin with lamenting the want of enterprise and the apathy among landowners to the use of embankments, whereby extensive tracts of their estates are allowed to lie waste from exposure to sea or river inundations; and no doubt proprietors have generally and naturally a disinclination to these as well as other extensive undertakings, of which by far the greater number would prove beneficial, although there are others, and such as we often see proposed, which would hardly repay the cost of improvement. But let the advantages, in every case, be clearly ascertained, and we should hardly doubt these improvements could fail to be carried into effect. Nothing, therefore, can tend so much to promote their adoption as the diffusion of accurate information, such as the Highland Society has now brought forward on the Nature and Principles of Embankments, and the expense of their construction, whereby any one can satisfy himself generally as to the advantages or disadvantages of his own situation, and, if the case proves favourable, can then procure the necessary assistance for carrying on the works. It is of the first importance, therefore, in such cases, to ascertain the probable expense of the embankment; and this will depend on its extent, and the materials of which it is composed. If it be for resisting the encroachments of a river or its banks, by the ordinary and daily action of the waters, the best defence is merely to throw down, along the banks, at the places most exposed to injury, a quantity of rough, and not very large stones, leaving them to find their own bed, until they form a slope from the bottom to the top of the bank, or a little above the ordinary level of the water. The expense of such embankments or bulwarks will depend entirely on that of procuring the stones, of which an estimate can easily be obtained, the quantity being determined by the extent of banks

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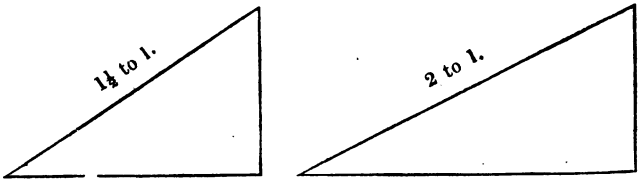
and the length of the slope from top to bottom. In all cases, the stones should be laid parallel with the banks. To run them across the stream, or even oblique to it, in the form of jettees, as recommended by some authors, in the view of diverting the natural course of the river, should never be attempted, as these, if they protect one part of the banks, are sure to throw the water with greater violence on another; and are, in many other respects, injudicious, and ill adapted for resisting the effects of the stream. Where stones cannot be obtained, the only other recourse is in wooden piles driven in a similar manner parallel with the banks, warped with branches of trees or bushes, and the spaces behind filled up with the same, with furze, or other such materials. The expense of all this may be easily calculated in any situation. Where the stream acts with peculiar violence, and stones large enough to withstand it cannot be had, wooden piles or cradles may be used with advantage, to keep the smaller stones together, somewhat in the way described on the Don.

If the embankment, again, be only to resist occasional floods, it is, in all cases, quite sufficient to form it of earth or soil taken from the adjacent lands. But these loose materials cannot be raised up into a wall without spreading out at the base in proportion to their height; and hence arises the necessity of that ridge form which we observe in all embankments of earth, narrow at the top, and very wide at the base, the sides sloping greatly from top to bottom. The smallest angle at which loose earth will lie, so as to form a permanent mass, is when the base spreads out at the rate of $1\frac{1}{2}$ or 2 feet horizontal for every foot in height, thus :—



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If the slope can be laid or built up with strong turf, it could be made to stand much steeper than this, as in the case of turf-dikes. But, besides that these are not very permanent, unless considerably sloped, the embankment must have strength to hold in the waters of the rivers during floods; and this can only be obtained by founding it on a broad basis, and sloping the sides in proportion, otherwise it would soon be overset by the powerful action of the fluid standing against it, and pressing it externally with a pressure everywhere proportional to the square of its depth. A considerable breadth is also required to prevent the water from rushing through the bank, particularly if it be of a sandy or gravelly nature, unless a puddle-wall of clay be carried up through the heart of it, which, however, for occasional inundations, is hardly necessary. With a gentle slope, also, the sides of the bank will carry crops of excellent grass, and thus the ground will be turned to account. In every view, then, the sloping of the sides of the embankment is of advantage; and however more, it should never be less, than what has been stated, unless other circumstances should require it. In the view, for example, of forming the land-slope into a fence, it may then be reduced, with the aid of turf, to a slope of one-half foot horizontal to one perpendicular, but not less. But if stuff can be easily had, it would be still better to keep up the slope, and erect some fence on the top of the bank. Towards the river, the slope of the bank has still other advantages. As the level of the water rises in floods, it enables it to spread out into a wider and wider channel, and thus checks the farther rise of the inundation as well as the increasing rapidity of the current; in which view, also, the embankment is often carried a considerable way off the natural channel of the river. When the current of the river also, is rapid, the side of the embankment is liable to be torn up, and the loose materials which compose it wasted away in the stream. Nothing serves to withstand this action so effec-

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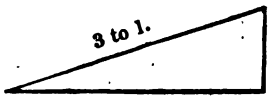
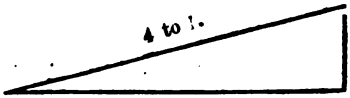
tually as the sloping plane, which, presenting a large extent of surface to the waters, diminishes in proportion the intensity of their action, while the flatness of the bank, promoting the vegetation of the grass, a hard and firm surface is soon formed, which resists completely the violence of the stream. On these accounts, the slope towards the river, however much more, should seldom be less than 3 or 4 feet horizontal to 1 perpendicular, thus :—





Having, therefore, determined by these principles the slope of the bank on each side, and its height by that of the highest inundation, taking care to raise it every where 2 or 3 feet higher than this, it is easy to compute the number of cubic yards of material required for every lineal yard of the bank, by multiplying the sum of the breadths at top and bottom by half the height, all in yards, and this again by the whole length of the embankment, which gives the number of yards in the whole. The price per yard will vary according to the difficulties in forming the bank, and procuring the materials, from 2d. per cubic yard to 6d.

Should the external slope of the embankment be exposed to the action of the tides and the waves of any sea or firth, it will hardly be practicable, unless perhaps in the case of the spring-tides only, with turf alone to preserve its surface for any length of time,—the daily action of the water destroying vegetation, and the waves tearing up the surface. The best resource, in this case, will be found, if it can be had, in the stone-bulwark which should be built along the bank, still in a direction sloping not less than $1\frac{1}{2}$ or 2 to 1 from the surface of the ground up to the level of high water of spring-tides, from whence the remaining height may be made up with turf sloping 3 or 4 to 1 as before. The stones of the bul-

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wark should be as large as possible, well built, and as closely jointed as practicable. Immediately behind, the space should be filled up with smaller stones thrown in at random, such as cannot be drawn by the reflux of the waves through the joints of the larger ones. Behind these, again, the space should be filled with still smaller stones or gravel, and then with turf, furze, or other material, to prevent the sand or earth of the embankment from being washed away by the reaction of the waters. These bulwarks become rather expensive for ordinary embankments, particularly where they require raising to any height. Along the shores near Newhaven and Leith, for example, which are protected in this manner by bulwarks extending down nearly to the level of half tide, and where the stones are found on the adjacent beach, the expense runs not less than from 4s. to 6s. per square yard, reckoned along the surface of the bulwark, so that, if this, for instance, be only 12 feet from top to bottom, every lineal yard will cost 15s., besides the expense of the embankment itself. In every case, the expense will depend on the extent of surface in the bulwark, and the price per yard of collecting and building the stones. Where stones, however, cannot be had, or where the expense is too great, other means have been resorted to for defending the bank, such as are much used in Holland, and in England along the coast of Lincolnshire, and other places. These consist of reeds or straw kept down by planks or pieces of wood pinned into the bank; faggots, wicker-hurdles, nets of straw-ropes, &c. laid along the surface of the bank, or wicker-hedges raised along the bottom, or in parallel rows along the slope of the bank. These plans require unremitting attention to repair the openings or breaks which are constantly occurring in the banks; and, for this purpose, they are regularly watched throughout the year.

On the whole, then, it will, in general, be easy, on the above principles, to form a tolerable estimate of the expense

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of an embankment in any situation; and knowing the probable value of the ground to be reclaimed by it, the propriety of executing it or not will at once appear, and, in this manner, it may be hoped that such schemes as are really beneficial will be promoted, while others of doubtful issue will be discouraged.

ON THE CULTIVATION OF LUCERN. *By Mr JOHN CUNINGHAME, Dolphingston, near Tranent.*

[The Highland Society having reason to believe that Lucerne. (*Medicago sativa*) although hitherto cultivated only on a small scale in Scotland, might be more extensively grown, with great advantage, in many situations, offered, in 1829, a premium for the best Essay on the necessary culture for raising that plant. The following communication on the subject, for which the honorary silver medal was voted, is printed in its original form, as it contains much valuable information respecting the mode of treatment, comparative value, and most advantageous employment of the plant in question.]

HAVING been for several years past much struck with the luxuriant appearance of a piece of Lucerne grown by Mr Guthrie, at the west end of Portobello, near Edinburgh, seemingly upon very indifferent soil, I called upon Mr Guthrie for the purpose of making particular inquiry respecting the merits of this species of clover. He very kindly gave me the information desired, and the conversation having satisfied me as to its being a plant of the greatest value, I resolved to try it myself. Mr Guthrie had grown it upon the same piece of ground for about seventeen years without any manure, and found it most excellent food for work-horses and other cattle. The information thus obtained determined me to sow about

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three acres, in the spring of 1826, upon a piece of light gravelly soil, being at the time under a crop of Swedish turnips, and very conveniently situated, as it was close to the stack-yard. This first trial having proved highly satisfactory, we have extended the cultivation of it upon a small scale every year since. The following is a short account of our proceedings.

In spring 1826, on the 19th and 20th of April, we sowed about three acres of lucerne, at the rate of 18 lb. per acre, in drills 12 inches asunder; the soil mostly of a light gravel several feet deep, part of it a deep loam, and a small piece wet clay. The previous crop was Swedish turnip. Not only the whole turnip that grew upon the ground was consumed upon it by sheep, but about as much more was brought from another part of the field and also eaten upon the part that was sown with lucerne. When the sheep were removed, which was not until the first week in April, it was thrice ploughed as deep as it was possible to be done, well harrowed and rolled, and all the stones carefully picked before sowing. Of course this piece of ground, by this preparation, was put in the very best condition for receiving a crop; but the summer of the year 1826 must be long remembered by every one connected with agriculture, owing to the severe drought, as being most disastrous to the cultivation of every sort of green crop, more particularly upon dry soils. In about ten days after it was sown it made a very partial braird. A few hours rain falling upon the 26th of May made the remainder of the seed appear pretty regularly above ground; but the dry weather again setting in, in a few days it became so much overrun with annual weeds, that the rows could hardly be discerned. Indeed, the millions of weeds, particularly red poppies, made it very doubtful whether it was possible to clear it; and had it not been for having a good command of outworkers, and a very strong inclination of giving it every possible chance, it would certainly have

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been ploughed up. Commenced hand-weeding it upon the 1st of June, with 24 hands. They had to go upon their knees and pick it with the greatest care. It took them about three days to go over an acre, the ground being so very hard and dry, that the greater part of the weeds broke, and the lucerne making so little progress, that the hand-picking had to be repeated in about two weeks. It took the same number of hands one day to go over an acre the second time, after which, at intervals, it got two hoeings, the first with the common turnip-hoe, and the second with the three-toed turnip-pickers, instruments which are used for taking turnips out of the ground in the time of frost, or for gathering potatoes. In the month of July it was severely attacked by the fly, and also part of it very much thinned by the grub worm. Several showers falling in the end of July and beginning of August made it look very fresh, and kept it growing until the middle of November, by which time we cut a pretty good crop about eighteen inches long, although part of it was very thin owing to the grub worm. It was given to the cows and horses, but owing to the ground being very loose with so much working during summer, and the weather rather wet at the time of cutting, a great deal of sand adhered to it, which caused the stock not to be very fond of this crop. This cutting, upon the whole, was of very little value, notwithstanding all the expense attending it; which expense exceeded £5, exclusive of the rent and preparation of the soil. From the observations made at the time, the whole cost upon an acre was as follows:

24 hands for three days hand picking the first time, at 8d.	L. 2	8	0
24 do. for one day hand picking the second time, at 8d. -	0	16	0
Hoeing twice and gathering off stones, - -	0	14	0
Seed, 14 lbs. at 1s. 4d. - - -	1	2	0
3 men employed sowing and making the drills, for 2 days, at 1s. 6d.	0	9	0
	L. 5	9	0

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The work was all done by boys and girls, except the sowing. The very unfavourable season causing the plant to come so very slowly forward, and the work people employed being unaccustomed to the different operations, all tended to make the expense much greater than would have been the case under different circumstances.

As early in the following spring (1827) as the month of February, it began to grow and assume a very rich dark green colour: it was at this time gone over again with the pickers, and got a double tine of the heavy harrows, which seemed to benefit it much. It was quite ready for the scythe by the end of April, and would have been cut at that time had it not been for a heavy fall of snow upon the 24th and 25th of that month; which, although so late in the season, was blown to the depth of from two to three feet upon most part of the lucerne, and continuing for some days, broke and laid it so much down, that it was not until the 7th of May that it recovered so as to admit of being properly cut. By this time it was about two feet long and quite thick enough, except a little part of it, which still bore the effects of the grub worm. Before the first crop was all cut, which was about the middle of June, it attained the length of from four to five feet. By this time the second crop was again ready for cutting, and we had a constant succession of it until the middle of November, by which time we had cut four most abundant crops, except a little piece which was last of being cut the first time, and which only yielded three crops. It was consumed by the cows and horses. The cows got it for the first two or three weeks both night and day, and afterwards only during the night. The horses were kept upon it close for the first two weeks, and afterwards got it only in the middle of the day. The cows had not been upon it for two or three days until they increased considerably in the quantity of milk, which was also much better in quality. Before getting the lucerne they were fed upon turnips.

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The horses never were in better health and condition than when fed upon lucerne. One mare, which was rather troublesome when put into the park, was kept in the house constantly through the summer, and always fed upon lucerne. She kept in excellent order, fully equal to any of the others; and being always at hand, got a good deal of extra work at times when the rest were in the park. All the expense and trouble that was bestowed upon this crop last year, was fully repaid by the most abundant quantity of excellent food we have got from it during this summer, when very little of the grass seeds sown down last year have stood for a crop. Fifty acres upon this farm were ploughed up, owing to the drought last summer, and even what remained was a very indifferent crop, very little of it cutting a second time. The lucerne cut four times, and each cutting was much superior to the first cutting of the clover and rye-grass.

Nearly two acres, lying close by Prestonpans, was sown down this spring, under the following circumstances. The previous crop was wheat after potatoes, which had been sown with grass seeds in 1826; the grass seeds failed, and the wheat stubble was ploughed in the month of December, very deep. The soil was generally a soft black loam, of about 18 inches deep, upon a subsoil of white dry sand. One part was of a deep heavy loam. It was twice ploughed over in the spring, as deep as the plough could go; the first time about the middle of March, and the second in the first week of April. It was sown at the rate of 25 lb. of seed per acre. About the middle of the month one-half of it made its appearance above ground in eight days, a very thick equal braird; the other half had been bad seed, and never made its appearance. The ground of this half was again ploughed and sown about the end of May, which sowing brairded well, but in a very few days was attacked by the fly, and in the course of two weeks was entirely destroyed, so much so that

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it had again to be ploughed up. There was a very good crop cut from that part where the seed was good by the middle of October.

The cleaning and bringing forward of this crop did not cost half the expense that it did last season. It was found a very great improvement to allow the land to lie, after being in order for the seed, about ten days before sowing. In this case, all the annuals near the surface vegetated, and were killed by the putting in of the lucerne, and by going over it carefully with the Dutch hoe as soon as it appeared above ground. By this method, it did not take above one-third of the time to go over it the first time with hand-weeding, as in the preceding year.

In 1828, commenced cutting the three acres behind the stack-yard this year upon the 1st of May, and I had again four excellent crops of it, which lasted until the month of November, (a small piece which was long of being cut the first time, as, in the year before, cut only three times). It gave quite as much satisfaction during this summer as last, with regard to both quantity and quality of produce, the cows giving more milk than when upon good pasture, and the horses thriving, and in excellent condition. That which was sown down near Prestonpans, last year, grew equally well, and was let to a person close at hand; and, although hardly an acre of it, kept four horses nearly all summer. It is to be regretted that there generally exists a prejudice against even giving a fair trial to any thing new of this sort with a certain class of people. This was found to be a good deal the case in letting the lucerne for the first time; but being convinced that, after obtaining a fair trial, its value would be more fully appreciated the next season, I submitted to its being let at a very moderate rent, not equal to what would have been given for an ordinary crop of grass in the neighbourhood. The piece of ground which failed last year after being twice sown, got a little dung, and

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was again sown this spring along with about one acre and a half more in the same field. This piece of land was under the same rotation, with this exception, that in spring 1827 the grass looked pretty well upon it, and was allowed to stand until a crop of hay was taken; after which it was ploughed up, and rag-fallowed (lying in fallow for the remainder of the season). Both of these lots were sown with lucerne, about the 18th of April, with 25 lb. of seed per acre. It all came up thick and equal, and was not in the least injured by the fly this year. Cut a very fine crop in the first week of October, which was made into hay, being rather far from the steading to be used green.

In 1829, commenced cutting on the 18th of May behind the stack-yard, and consumed it, as usual, with the cows and horses. Wishing to ascertain correctly, by repeated trials, the value of it, compared with good pasture, with regard to producing milk; from five cows I found the result to be as follows. After being kept altogether upon lucerne for about ten days, each cow's milk was measured by itself, and the produce, in Scots pints, was as under,—

No. 1	Calved in	March,	and gave	13 pints upon the 28th of May.
No. 2	ditto	December,	do.	4¾ do.
No. 3	ditto	January,	do.	10¾ do.
No. 4	ditto	ditto	do.	6½ do.
No. 5	ditto	May,	do.	10 do.
				46

They were then turned out to pasture until the 8th of June, and again measured; when the produce was as follows,—

No. 1	gave	12½	pints.
No. 2	do.	3¾	do.
No. 3	do.	9¼	do.
No. 4	do.	6¾	do.
No. 5	do.	10½	do.
		42¾	

No. 5 was the only one that increased when put to grass. She was a new cow that came from Ayrshire, and, when kept in the straw-yard, was a good deal pushed about by the rest, which, I have no doubt, was the cause of her not doing so well then.

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They were again put into the straw-yard and kept close upon lucerne until the 13th of June, when

No. 1	gave	12¾	pints.
No. 2	do.	3½	do.
No. 3	do.	10¾	do.
No. 4	do.	7	do.
No. 5	do.	10	do.
		44	

These were put to pasture again until the 13th of July, when

No. 1	gave	10	pints.
No. 2	do.	8¼	do.
No. 3	do.	9¼	do.
No. 4	do.	5	do.
No. 5	do.	9	do.
		41½	

In this last mentioned trial, No. 2 was a cow that calved about the time when they went last to pasture; and that which was No. 2 in the previous trials was withdrawn, as she was becoming nearly dry. They were again put upon lucerne until the 19th of July, when they were again tried, and

No. 1	gave	11	pints.
No. 2	do.	10¼	do.
No. 3	do.	10	do.
No. 4	do.	6	do.
No. 5	do.	8¼	do.
		45½	

This was a very considerable improvement, considering that the cows, with the exception of No. 2, were getting long from the calving. The butter was of the finest quality.

Both pieces that were sown near Prestonpans last year have done very well this season; and with regard to its becoming a useful plant for feeding horses, I have only to add, that the individual who took part of it last year, took this year double the quantity, and also gave a higher rent, quite as much as the best clover would let for in the neighbourhood. Other two customers have now come forward and taken small pieces each of what remained, one of whom had his lot upon a piece of ground that had been a garden, and, although not a rood in extent, it kept his horse in excellent condition from the 24th of May until this time, 20th of November, although he was constantly employed upon the road.

Thinking it would be a great saving if it would answer to

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be sown as late as the month of August, whereby a crop of early potatoes might be first taken from the ground, nearly an acre was sown in this way for a trial this year, and after a good crop of early potatoes, the ground was twice very deep ploughed, and got into good order for receiving the seed by the 10th of August, on which day it was sown, at the rate of about 30 lb. of seed per acre. In about ten days it made a very good braird; but, being engaged with the harvest, I did not see it again for about two weeks, when I expected to find it ready for thinning. To my great disappointment, however, I was scarcely able to discover a plant: whether it had been devoured by the fly, or had perished by the cold wet weather, I could not say, but so it was that it became a complete failure.

I have never tried sowing it with a corn crop, although, perhaps, it may answer. Still, I am clearly of opinion, both from my own experience, and the observations I have made upon the crops of others, that lucerne is a plant that not only requires the ground in good order, and clean, but, unless it is nursed with the greatest care and attention for the first season, and being, what I think it is, one of the most valuable green plants we are yet acquainted with, if once stunted when young, it will always be one of the most worthless and profitless as long as it stands; and when once brought through the first two or three months, it seems the hardiest of the clover species, as it appears to suffer less from the frost, both in spring and autum, than any other. And as it is likely to stand for a whole lease without being renewed, I think a crop of corn, in that case, of little consideration, if there is the smallest chance of damaging this plant; and, although I may be in error, yet I should suppose, if a corn crop grown with it does it no harm, it will yet do it no good.

It is now become such a favourite crop in this parish, that it is no uncommon thing to see in some of the gardens, which are held under very high rents, considerable spaces laid off

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for the cultivation of lucern. It is with great pleasure that I am at liberty, here, to state the opinion of two or three highly respectable individuals, who have grown and used it for their horses for the last two years. Mr Paterson, Banktown, in 1827, laid down nearly 3 acres upon a light sandy soil at the east end of Prestonpans, and had three or four excellent crops from it the following year. He was quite of opinion that his horses kept in far better condition than they used to do when fed upon clover and rye-grass, although they got less corn.

Mr Fowler, Prestonpans, sowed down from 3 to 4 acres in 1828, upon a very poor, weak, sandy, soil, near Port-Seaton, which suceeded in growing lucerne to his utmost expectations. He has had three excellent cuttings from it this summer; and both he, and all his servants, are of opinion, that his work-horses kept in better condition upon it than upon grass. I should think, that this piece of ground was always reckoned the worst that Mr Fowler farmed; but when put under this crop it is more than probable that it has yielded a return this year fully equal to his best land under any other crop whatever. Mr Cadell of Cockenzie also has grown it upon a small scale, upon a sandy soil, and being quite satisfied of its being a plant of great value, intends extending its cultivation.

I by no means wish to be understood as saying that a very light soil is the best adapted for the cultivation of lucerne, although I am of opinion that it will grow, thrive better, and be more profitable upon a very light soil, than perhaps any other plant. Still, if you want to have it of the best quality you must give it good land. The soil which we have found to suit it best, is a deep soft loam, although it seems to thrive very well on any dry sort of soil, provided it has a loose open subsoil, so that the roots may get down, as they will reach the depth of from three to four feet.

I cannot presume, exactly, to state what may be the best

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possible preparation of the soil for the cultivation of lucerne, or the best method of sowing the seed; but from the experience we have had for the last three years, the following opinions have been formed:

In no preparation of the soil has it succeeded better than where it was sown in the year 1826 (although a very unfavourable season), after turnips, eaten off the ground by sheep. I would certainly recommend to those who wish to cultivate this valuable plant, to sow it (if convenient) with the same preparation; but under whatever circumstances it may be sown, no trouble should be spared in making the ground perfectly clean, otherwise disappointment will, undoubtedly, be the result. There never should be more sown in one year than can be properly attended to in the cleaning when young; and I think there are few farms that may not have some acres adapted to the growth of lucerne. The only spot where it did not seem to thrive well, was upon a piece of wet hard clay. After the first season, it requires little more attention than to be gone over, perhaps once or twice, with the three-toed pickers, once in autumn, and again in spring, when it ought to be well harrowed. And I should suppose, that it will be found by those who try it, to be a most valuable plant, and a complete substitute for tares, which are both an expensive and a severe crop for the land.

The distance betwixt the rows which we have found to answer best, is from 14 to 15 inches, although it seemed to grow as well at 12 inches. In the latter case, however, after standing for a few years it does not admit of being so perfectly hoed. The most convenient plan that we found for sowing it, is after the ground has lain for about ten days, and the annuals have sprung up, for a man to go over it with a one-horse small paring plough, and form it into ridges as ebb as possible. If the seed is two inches under ground when the drills are levelled, it seems quite sufficient. The seed is put into a bottle, and a piece cut out of the side of the cork, or a quill put into it, so as to allow the seed to run from it fast

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enough to sow about 25 lb. upon an acre, which quantity we have found to answer well; and one man following the plough, with the bottle in his hand, and properly regulated, will go over an acre in a day. I have no doubt that a machine might be used which would sow it more expeditiously.

It would not be easy to determine the exact expense requisite for bringing forward an acre, as it would differ so much under different circumstances The little that was made into hay got rather dry and hard, although the horses seemed to eat it very readily; but the quantity being so small, did not afford an opportunity of ascertaining the effect it had upon their condition. However, I have no doubt that it is more advantageous to use it always as green food, and should suppose that clover and rye-grass make fully as good hay. But in comparing the quantity of lucerne produced upon an acre during the season, with that of clover and rye-grass, I have not the least hesitation in saying, that any acre of lucerne we have produces, at the least, one-third more, either in green food or hay.

ACCOUNT OF EXPERIMENTS ON PLOUGHING DOWN BUCKWHEAT AS A MANURE. *By Mr Robert Ballingal, Farmer of Treaton, near Markinch.*

My first experiments were made in 1826, upon part of a field of clay-loam, which had been recently limed, and was by no means exhausted, or in bad order. The Buckwheat was sown at the rate of 2½ bushels, or little more, per Scotch acre, so late as the 21st day of July, and cut down and ploughed in on the 16th September. But the sowing of the common wheat was protracted, for want of moisture, until the 2d October. The crop of wheat raised from this vegetable manure was of excellent quality, and equally bulky in straw as the other crops of that grain produced by a sufficiency of farmyard dung.

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Not feeling sanguine as to the success of the experiment, I had nearly one-half of the buckwheat driven home, and mixed with straw, as food for cattle, it being universally predicted that the ensuing winter would be one of scarcity of fodder. It may be mentioned, that the cattle consumed the mixed straw with avidity. The portion of ground left was not measured, in this first experiment, and for this reason, the produce was not exactly ascertained. But the result fully warranted another trial.

This second experiment was made in 1827, upon a field of 18 Scotch acres, composed of dry gravelly loam, equally divided, one-half under summer fallow, manured with buckwheat, the other half (decidedly the best land for wheat) under potatoes. The treatment and produce of both sides of the field were as follows :—

East side.—POTATOES.

9 acres, manured with 10 double cart-loads of dung per acre, at 6s. 6d. per cart,	L.3	0	6			
After the potatoes, 8 double cart-loads per acre were applied to the wheat, at 6s.	2	8	0			
Spreading ditto,	0	2	0			
Total value of dung per acre,	L.5	10	0			
Deduct two-thirds of the first mentioned quantity, supposed to have been wasted by the potato crop,	2	0	0			
	L.3	10	0			
The whole 9 acres, at the above rate of L. 3, 10s.				L.31	10	0

West side.—SUMMER FALLOW.

9 acres of fallow, sown on the 4th July, with 23 bushels of buckwheat, at 8s. per bushel,	L.9	4	0			
Expense of cutting on the 27th August, and girls laying the buckwheat neatly into the furrow,	2	0	0			
				11	4	0
Difference of outlay upon 9 acres,				L.20	6	0

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The rate per acre of potato land, as stated above, .	L. 3	10	0
Do. do. of the summer fallow, . .	1	4	10½
Difference of outlay upon 1 acre, . .	L. 2	5	1½

The wheat crops raised from the above manures, on each half of the field, were good, considering the season of 1828, and stood as follows :—

From the buckwheat manure, the produce of wheat (weighing from 15 stones 10 lb. to 16 stones, per 4 imperial bushels), was . . . . . Bolls,	9	1	0
From the farm-yard dung applied before and after the crop of potatoes, as stated above (average weight of wheat 15 stones 6 lb. per 4 imperial bushels), . .	7	3	2
Balance in favour of the buckwheat, . equal to 5½ bushels standard measure.	B. 1	1	2

The third experiment I made in 1828, in a field of 8 acres; the soil partly of a sandy nature, partly clay, and not limed for many years. The crop was fully equal in bulk, and apparently in quality, to my other wheats this season.

The luxuriant growth of the buckwheat induced me to ascertain the weight, per Scotch acre, when ploughed down, which I found to be 1300 stones (22 oz. to the pound). In some parts of the field, where the soil inclines to moss, which had been covered from the headlands with earth, the quantity of buckwheat was so great, that it was found necessary to drive it off to some knolls where the soil and quantity were inferior.

The facts above stated are all that I can prefer with any degree of certainty respecting the buckwheat manure, as these three trials were all that I made. I may observe, for the information of those who may try this vegetable manure, that it is needless to attempt to grow it upon damp soils, or to expect full crops upon lands exhausted by overcropping. Upwards of fifty acres of wheat have been raised this season

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(1829) in my neighbourhood, by the buckwheat manure, and none of the fields that I have seen can be reckoned a failure which proves, to a certain extent, its usefulness.

[To have rendered more apparent the result of this experiment, it is conceived that Mr Ballingal should have stated the produce of the potato crop. It must be observed, too, that a serious objection may be urged against the utility of the practice in question, from the circumstance that the fallow land is covered with a crop for nearly two months in summer, during which, under the most approved system of the management of summer fallows, the tillage of the ground should be carried on with efficacy and vigour.—EDITOR.]

ON THE CONSTRUCTION OF LIME-KILNS. *By C. G. STUART MENTEATH, Esq. of Closeburn.*

[A Premium having being been offered by the Society, "For the best and approved Report, founded on experiment, on the Construction of Lime-Kilns, comprehending the most recent improvements thereon, and pointing out the means by which the greatest quantity of lime may be obtained with the least consumption of fuel," the following Communication, accompanied by Models, has been received from Mr Menteath.]

BEING engaged in burning lime for the supply of an extensive district of country for agricultural improvements, and being distant from coal sixteen miles, I found it desirable to discover the best constructed kiln for burning lime with the smallest quantity of coal. I was aware from experiment that the kilns generally employed in Great Britain for burning lime, of the construction narrow at bottom and wide at

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top (many kilns of this construction being not more than three or four feet wide at bottom, and eighteen feet wide at the height of twenty-one feet), waste the fuel during the process of calcining the lime, or, in other words, do not produce more than two measures of burnt lime-shells for one measure of coal. But it is to be understood, that in whatever construction of kiln lime is burnt, the fuel required to burn limestone must vary according to the softness, or hardness, or density of the stone, and the quality or strength of the coal used. The same measure of coal in Scotland called Chews, when employed, will burn a greater quantity of lime in a given time than the same quantity or weight of what is called Small Coal, the chews or little pieces of coal admitting the air to circulate more freely through the kiln. Though this fact should be well known to lime-burners, yet they frequently employ small coal in burning lime, from its being procured at a less price, though really at a greater expence, as it requires a much larger quantity to produce the same effect, and a longer time to admit of equal quantities of lime being drawn out of the same kiln in a given time.

For a sale of lime for agricultural purposes in a limited district, I have found kilns of small dimensions to be most profitable. The construction of a kiln I have employed for many years was of an oval shape, not more than two feet wide at bottom, widening gradually to five feet at the height of 18 feet, and continuing at that width to 28 feet high from the bottom. A kiln of this construction has been found to burn lime in much less time, and with a smaller proportion of fuel, than kilns of large dimensions, narrow at bottom and wide at top, as heat is well known to ascend more rapidly in a perpendicular than in a sloping direction, from which arises the superiority of a narrow kiln, with sides nearly perpendicular, compared with one with sides that slope rapidly.

These narrow kilns admit of there being drawn out of them

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every day, if fully employed, more than two-thirds, or nearly three-fourths, of what they contain, of well burnt lime, and afford fully three of lime-shells for one measure of coal, when large circular kilns will not give out more than one-half of their contents every day, and require nearly one of coal for every two measures of lime burnt. In a country sale of lime, the quantity sold every day is liable to great fluctuations, two or three cart-loads will sometimes only be required from an establishment which, the day before, supplied forty; and, as lime is known to be a commodity, when exposed to the action of the air, which becomes more bulky and heavy, and in that state does not admit of being carried to a distance without additional labour, it has been an object of importance with me to find out a construction of a kiln which will allow of lime being kept for several days without slaking, and at the same time to prevent the fire escaping at the top of the kiln, if the kiln stands twenty-four hours without being employed, especially during the autumn and winter, when the air is cold and the nights long. I now employ kilns of an egg shape, and also oval. The oval-shaped kilns are divided by arches across the kiln, descending four feet from the top. The object of the arches across the kilns is to prevent the sides of the kiln falling in or contracting, and also circular openings to to be formed for feeding in the stone and coal at the mouth of the kiln. Upon this plan, a kiln of any length might be constructed with numerous round mouths.

In the model of the kiln sent to the Highland Society, Booker's conical cover may be seen revolving upon an iron ring placed upon the circular mouth; and having placed a lid to the cover, I am enabled to prevent the escape of heat at the top, and by cast-iron doors at the bottom the air is prevented from passing through the kiln, so that by these precautions the lime-burner can regulate the heat, and prevent its escape for several days, when the fire would be extinguished in winter in the course of 24 hours. This is an object of

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great importance, as it enables one to burn lime as well, and with as small a quantity of fuel in the winter as the summer season, and to supply the farmer with as well burned lime, and at any time of the year, which cannot be done in the common construction of kilns, open both at top and bottom, for the reasons I have before stated. From the great expense attending the driving of fuel from a distance of 25 miles from my own coal-pits, I have adopted the practice of coking the coal, which is a saving of 8-20ths of the weight, and I find that an equal measure of coal and coke have the same quantity of heat in burning lime, which is somewhat paradoxical, but not the less true. The coal is found to have little effect upon the stone till it is deprived of its bitumen, or is coked in the kiln; for, during the time the smoke is emitted from the top of a lime-kiln, little or no heat is evolved; or, in other words, the smoke carries off the heat, which is not given out from the smoke till it is inflamed, a circumstance which does not take place in the ordinary lime-kilns. A patent has been obtained by a person at Maidstone, for burning lime by the flame of the coal in the conversion of it into coke. The flame arising from the burning fuel is passed through a long narrow cylinder, or small lime-kiln, containing broken chalk or limestone, which is, no doubt, calcined, but in such trifling quantities, that it cannot be considered an object to burn lime at the same time that coke is made, unless where fuel is very scarce, and coke, in any quantity, is in demand.

When coke is employed for burning lime during the day, small coal should be used in the evening, in order to prevent as much as possible the escape or waste of heat during the night, from the rapid circulation of air through the limestone in the kiln where coke is the fuel made use of for its calcination. A kiln in which coke is the fuel employed will yield near a third more lime-shells in a given time than when coal is the fuel, so that coke may be used occasionally when a greater quantity of lime is required in a certain time than usual, as it

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is well known to lime-burners that the process of burning is done most economically when the kiln is in full action, so as almost constantly to have a column of fire from the bottom to the top of the kiln, with as short intervals as possible in working the kiln.

I have found that limestone is apt to be vitrified during the process of calcination during stormy weather, from the increased circulation of air through the kiln, which adds much to the heat derived from the fuel employed, and which experienced lime-burners would have diminished could they be aware at all times of an occurrence of this kind. From having experience of the bad effects of too great a circulation without properly providing against it, I have reason to believe, that, having a power to throw in at pleasure an additional quantity of air into the bottom of a lime-kiln, a considerable saving of fuel necessary for the calcination of lime would take place; and another object would be gained, that of cooling the limestone in the bottom of the kiln, which frequently retards the drawing out of the burnt limestone for some hours, or until the limestone is so cold as not to burn the wooden structure of carts.

In working a kiln with narrow circular mouths, the stone and coal should be carefully measured, so that the workmen can proportion the fuel employed to the quantity of stones; and it is obvious, that the quantity of coal to be used, must depend upon its relative quality, and the hardness of the stone to be burnt. If this measure was adopted in kilns of any construction, the lime-shells would be found better burnt.

CLOSEBURN HALL,
January 11. 1830.

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DESCRIPTION OF AN IMPROVED GRUBBER, *invented by Mr JAMES KIRKWOOD, Blacksmith, Tranent.*

THE peculiar advantage of this Grubber is, that the whole body of the instrument, and of course all the teeth, can be raised out of the ground at pleasure, and even while the machine is in motion; which is extremely convenient, not only in turning at the head ridges, but whenever an obstruction is met with in the ground, arising from rocky, retentive, or other impenetrable soils. In such of these as would completely interrupt the progress of the ordinary instrument, this proceeds with ease, by merely being lifted more or less over them. The operation is performed by the driver bearing with his weight on the guiding handles of the grubber, and this pressure is made to raise the whole machine by a very skilful application of mechanical power, which will be understood, as well as the whole construction of the instrument, by inspecting the figures in Plate II.

The pressure on the guiding handles at A, it will be observed, turns the whole handle round the axle of the hind wheels BB, as round a fulcrum, so that the handle then becomes a lever, on the shorter extremity of which the frame of the teeth rests. It is evident, therefore, that by bearing on the handle which forms the long end of the lever, the shorter end must be raised, and along with it, the hinder part of the teeth frame, and of course the teeth also. But there is still another contrivance by which the force is made to act at the same time on the fore part of the frame, and to raise it likewise. This is done by a long rod DE, which is attached at the extremity to a fulcrum D, raised on the handle frame, and at the other to the one end of a bent lever EFG, which turns on the axle of the fore wheel as a centre, and at an intermediate point carries the fore end of the teeth frame. While the handle, therefore, is depressed, and raises the hin-

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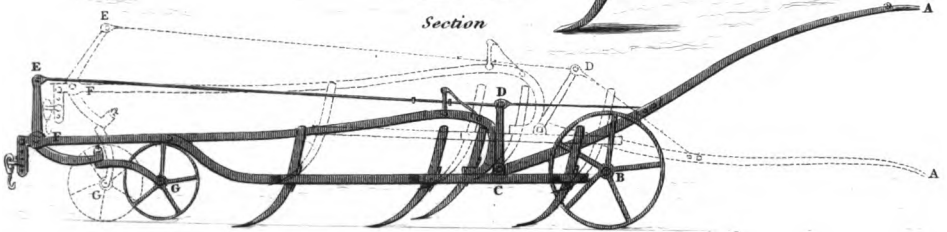
PLATE II.

KIRKWOOD'S GRUBBER

Perspective view.

Section



IMPROVED MORTICE & TENON JOINTS.

Fig. 1. A.

Fig. 1. B. & C.

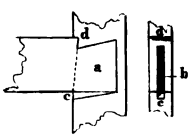


Fig. 2. A.

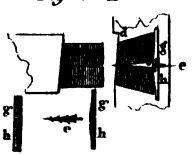


Fig. 2. B. & C.

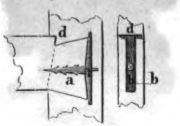


Fig. 3.

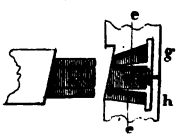
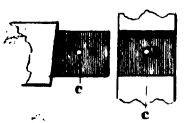


Fig. 4.



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der part of this frame, it at the same time pulls the rod, turns the front lever round the axle of the fore wheel, and by this means elevates the teeth before as well as behind. The whole operation is simple, ingenious, and efficient. In the section, the machine is supposed to be on the ground, but the dotted lines shew its situation when raised above it.

DESCRIPTION OF AN IMPROVED MORTICE AND TENON JOINT.

By Mr GEORGE WILLIAMS, *Land-Surveyor, Edinburgh.*

THE attempts made to obviate the defects of the common Mortice and Tenon Joint have hitherto proved ineffectual. The use of iron-work, to which recourse has been had, rather increases than diminishes these defects; for, when decay has commenced, the work soon tends to settle, a strain ensues between the iron and the wood, the joint opens, and is held in that state by the iron-work, until the moisture, which finds easy access, entirely destroys it. In Plate II. are figures of two kinds of mortice and tenon joints, both superior to the common kind. The first is adapted to all kinds of work. It has been tried in a five-barred swing-gate, and was as sound and close after a lapse of nine years as at first. The second is adapted only to heavy work.

Fig. 1. shews an improved (dove-tailed) tenon. *A* represents the several parts disjoined, *B* the same put together; *a* the tenon, *b* the mortice, *c* the wedge. The mortice is cut only sufficiently low to allow the tenon to slip in, when the wedge *c* is driven in (with glue) which forces the dove-tail up into its place. The end of the tenon is imbedded in the mortice. The small shoulder *d* laps over the outer part of the tenon, and turns the wet down the angles of the post. The end of the wedge, although having the grain endways, is secure by being under the rail, and, at any rate, can be cover-

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ed by the insertion of a small piece upon it, and the nature of the joint effectually secures it from drawing. Should the wood at any time shrink, a renewal of the wedge will at once remedy the defect. *C* represents the mortice and wedge in front.

Fig. 2, *A B C*, shews the same as above. This figure represents a method of executing the dove-tailed mortice and tenon in a way wherein no part whatever of the joint is exposed; *a* and *b*, mortice and tenon, *c* an iron wedge, slightly barbed on the edges, with a screw at the base, which, passing through the holes of the iron abutments *g h*, at the bottom of the mortice, screws into the wood at the back. The mortice is dove-tailed both ways, and the wedge corresponds to the dove-tail. The tenon is not dove-tailed, but cut straight, and an incision made to receive the wedge at its first entrance. As the parts are forced together, the tenon spreads into the dove-tail of the mortice, and assumes the appearance presented by B. In light work the parts may be easily driven together, and in very heavy timber the use of a screw-purchase will be an easy means of effecting the purpose.

Fig. 3. Cases may occur in which the mortice is so narrow in proportion to its length that a difficulty may occur in turning the wedge so as to screw it into its place. The method here shewn removes the objection. The wedge *c* is halved, and the halves united to the respective parts of the abutment *g h*, which are themselves screwed to the back by a common screw, when the insertion of the tenon is made, and the same effects produced as shewn in Fig. 2.

Fig. 4 represents the common mortice and tenon; *a* the tenon, *b* the mortice, *c* the pinhole.

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REPORTS ON THE IMPROVEMENT OF WASTE LAND FOR TILLAGE.

[In the year 1828, the Society offered its Gold Medal "To the Proprietor or Tenant in Scotland who should, on or before the 10th of December in any year, transmit to the Society a satisfactory report of his having, within the period of five years immediately preceding the date of his communication, successfully improved and brought into tillage an extent of waste and hitherto uncultivated land, of not less than thirty acres." The report was further to comprehend such general observations on the improvement of waste land as the writer's experience might have led him to make; but to refer especially to the particular tract reclaimed, to the nature of the soil, the previous state of the ground, the obstacles opposed to its improvement, the mode of management adopted, the expense, and, in as far as could be ascertained, the value of the subsequent crops *. In competition for the premium of 1828, seven Essays were received, six of which are given in an abridged form, and the last is printed nearly entire. The result of these reports is satisfactory and encouraging to those who may embark in the improvement of waste land. There are various circumstances which operate in preventing or retarding the reclaiming of land. The species of land in question is frequently let to tenants of an inferior class, and of a limited capital: Besides, it is generally thought inexpedient or hazardous for a tenant to embark in an undertaking which may sink his capital in the property of another person, over which he has only a temporary and perhaps very limited

* This honorary premium is intended to be given annually, the quantity of land to be improved being, however, extended from thirty to a hundred acres.

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period of control. The usual duration of a lease in Scotland, about twenty years, has been sometimes held to be barely sufficient for the tenant realizing that capital, and the profits of that capital, which he may have expended in improving waste lands. But, it will be seen from the Essays which follow, that, in the majority of cases, these have been repaid, even within the limited period to which these Essays must refer, namely, five years. In other cases, indeed, and those especially where the heavy expense of trenching has been adopted, or where large outlays have been made in clearing the land of stones or other encumbrances, the lands have not, and indeed scarcely could, under any circumstances, be supposed to have repaid such an expenditure by the returns obtained from them during so limited a period; but, even in these, and they too the most unfavourable cases, it is gratifying to observe that the returns are progressively liquidating the outlay, and that they will soon extinguish it altogether.]

I.—REPORT ON THE CULTIVATION OF WASTE LAND ON THE ESTATE OF JOHN J. HOPE JOHNSTONE, ESQ. OF ANNANDALE, DUMFRIESSHIRE.

JOHN J. HOPE JOHNSTONE, Esq. of Annandale, has improved, at Goodhope, in the county of Dumfries, a piece of ground extending to 76 acres 1 rood 31 poles. The soil, with the exception of about 12 acres of deep flow moss, was mostly composed of moss or peat, of depths varying from 3 to 18 inches, all incumbent on a subsoil of *till*, but not very retentive. On a small portion of it, the moss on the surface was mixed with a good clay; and this, it may be observed, proved, in the course of cropping, to be by far the most productive. The surface of the whole was covered with heath and bent, with some mixture of rushes and coarse grass on the richer spots. It had a uniform gentle declivity, and lay

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well sheltered by plantations; but the height above the sea was little short of 500 feet. The average rent of this land was from 5s. to 6s. per acre. It was divided into three fields, measuring as follows,—No. 1, 25 acres 3 roods 39 poles; No. 2, 23 acres 2 roods 28 poles; No. 3, 26 acres 3 roods 4 poles.

In Nos. 1. and 2. the modes of improvement followed were precisely the same. The land was pared, burnt, and limed in the course of the summer, and sown with oats next spring; which were succeeded in the following year by a second crop of oats, sown down with about 2 bushels of perennial ryegrass seeds per acre, and some timothy-grass seeds. The hay was cut for one year, and the fields afterwards annually let for pasture. The expense of these operations was as follows:—

FIELD, No. I.

Paring and burning in summer 1821, part being not so managed,	L. 21	18	8
Ploughing and harrowing, the portion not pared having been frequently ploughed,	35	6	0
Lime, 1287 bushels, price at the kilns,	27	14	6
Carriage of ditto,—the distance being eighteen miles,	28	17	6
Ploughing and harrowing in spring 1827,	14	14	0
Seed, 120 bushels of potato-oats in 1822,	16	16	0
—— 130 ditto	11	13	4
Ryegrass and timothy-grass seeds,	7	2	1
Total expense of No. 1,	L. 164	2	1

Produce.

Oat crop of 1822, sold at	L. 83	0	1
Ditto of 1823, ditto	85	7	0
Hay crop in 1824,	91	6	6
Amount of Produce,	L. 259	13	7

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Field, No. II.

Paring,	L. 16	14	5
Lime, 1860 bushels,	33	6	2
Carriage of lime,	39	6	0
Ploughing and harrowing for crop 1825, a portion having been fallowed,	23	8	8
Ditto in spring 1826,	13	6	0
Seed, potato-oats in 1825, 112 bushels,	18	13	4
Ditto in 1826, 122 ditto	18	6	0
Grass seeds,	5	16	3
Total expense of No. 2.	L. 168	16	10

Produce.

Oats sold in 1825,	L. 86	6	6
Ditto in 1826,	155	14	1
Hay crop 1827,	56	14	2
	L. 298	14	9

Abstract of the Produce and Expenses.

No. 1,	Produce sold,	L. 259	13	7			
	Deduct expenses,	164	2	1	L. 95	11	6
No. 2,	Produce sold,	L. 298	14	9			
	Deduct expenses,	168	16	10	129	17	11
					L. 225	9	5
Deduct rent of 49 acres 2 roods 27 poles, in both fields at 4s. 4d. per acre,					43	12	0
Remains of clear profit of cultivation, besides increase of rent,					L. 181	17	5

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The increased value of the pasturage of the first of these fields has been distinctly ascertained by the rents given by public roup for the last four years. These have averaged L. 23 : 15 : 9, or 17s. 10d. per acre, being about four times the original rent.

The field No. 2. has only been let for 1828, and the rent was L. 15, 15s. In this field the grass-seeds failed, owing to the dry summer of 1826, and the mossy part of it was not well stocked with plants. But it has this year (1828) the appearance of rapidly improving, and it may be safely calculated that the two fields will, in future, give a rent of from L. 40 to L. 45.

The quantity of lime applied to the second field was considerably greater than to the first. This additional expense has not yet been compensated by any superiority in the crops; but it probably will be so by a more permanent improvement of the pastures. The crop of oats on both fields varied very much, according to the nature of the soil. In those portions where the moss was shallow, and mixed with clay, the crops were very luxuriant, approaching in good seasons fully to 56 bushels per acre. Where the moss was deepest, the crop was nearly a complete failure, particularly in the dry summer of 1826. The crops of ryegrass hay were very luxuriant on the best parts of the fields, yielding about 250 stones of 24 lb. per acre.

With regard to the future management of the fields, it is proposed to continue them in pasturage for some time, and to expend a few pounds on surface-drains, which will tend to consolidate the soil, and prevent the growth of coarse plants. Should these increase, and the pastures become less valuable, comparative trials will probably be made; either by applying lime to the surface at the rate of 55 or 60 bushels per acre, and continuing them in pasture grass, or occasionally cutting for hay; or by expending a larger sum in lime, and again

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ploughing for corn crops. The first probably, in point of profit, will be the best.

The field No. 3. consisted generally of regular moss (peat) of from 9 inches to 2 feet deep, with very little mixture of clay in it. The surface was covered with a fine sward of bent, with the exception of about 3 acres which grew rushes of various kinds. This part was not ploughed, but was much more efficiently improved by top-dressing with lime. The remainder of this field was intended to have been managed in the same manner as Nos. 1. and 2. It was pared and burned in the summer of 1825, limed at the rate of 32 bushels per acre; and sown with oats in 1826. The crops proved extremely bad; and it being found, that, from the deepness of the moss, the ploughing in the spring would be very difficult, advantage was taken of the dry and early harvest of that year to plough it immediately after the crop was reaped. It was sown in the beginning of September with ryegrass and timothy-grass seeds, which grew very luxuriantly, and afforded a good crop of hay in 1827. It has been let by public roup, to be cut for hay in 1828, and the crop has proved about 200 stones per acre. The surface is now covered with a rich sward of meadow grasses, and it is intended to keep it as meadow, and let it annually. It has now been surface-drained at an expense of about 5s. per acre.

The amount of expense of No. 3. was -	L. 152	16	8
Add original rent for four years, at 5s. per acre,	21	6	0
	L. 174	2	8
Deduct produce, viz. one crop of oats, and two of hay,	115	0	10
Cost of improvement,	L. 58	1	10

Though this field has been much less profitable in its first cultivation, the future annual clear return, looking forward to a period of years, will probably be greater than in the other cases.

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II.—REPORT OF THE IMPROVEMENT OF WASTE LAND ON THE FARM OF BUCHARN, IN THE PARISH OF GARTLY, ABERDEENSHIRE. *By Mr* GEORGE GORDON.

MR GORDON, factor for the Duke of Gordon, Bucharn, Aberdeenshire, has, during the last five years, brought into cultivation 116 acres 1 rood 24 poles of waste land. Part of this land was a dry hard soil, overgrown with heath, furze, or broom, and in some places with hazel and birch; part wet and spongy with springs, and producing rushes and coarse grass; and on the greater part of it were large or small stones in very considerable quantities. A part of this land was trenched, chiefly where, from stones, inequalities, or obstacles of a like kind, it was found inexpedient to use the plough; and the remainder was reclaimed by the plough. Where the turf was not completely pulverized or rotted, it was collected together in heaps upon the ground, and there burnt.

The expense of these operations was as follows:—

Trenching 83 acres 3 roods 7 poles, at prices varying from L. 4 to L. 7 per acre, - -	L. 479	18	4½
Ploughings and harrowings on the remainder,	73	7	8½
Making drains, chiefly at 4½d. per yard, -	146	8	7½
Open ditches, - - - -	39	12	6
Blasting stones, - - -	149	11	3
Removing stones, - - -	229	16	9 1/12
Lime for 93 acres, at the rate of 20 bolls of shells on an average per acre, at 3s. 3d. per boll,	308	15	0
Dung for 42 acres, at L. 5, 10s. per acre,	231	0	0
Total expense of improving 116 acres 1 rood 24 poles, - - -	L. 1652	18	3¼

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The produce and expense of each division is as follows :—

A.	R.	P.		Expense.	Produce.
39	1	37	have borne 5 crops, . .	£389 18 7¼	£681 12 11
6	2	32	... 4	91 0 0	178 1 0
12	1	11	... 3	139 9 0	170 13 6
21	2	22	... 2	99 17 10	110 0 0
18	1	32	... 1	186 10 7	32 2 6
15	3	10	have not borne a crop, .	205 19 3	
			Lime for 95 acres, . .	308 15 0	
			Dung for 42 acres, . .	231 0 0	
116	1	24		£1652 10 3¼	£1172 9 11

Hence the cost of improvement above what has been received for the produce is L. 480 : 0 : 4¼. But it will be seen that a part of that which is improved has not yet borne a crop, and a considerable quantity only one or two crops.

III.—REPORT ON THE CULTIVATION OF WASTE LANDS NEAR WICK. *By Mr JOHN LEITH.*

MR LEITH, in the year 1824, took from the Right Honourable Lord Duffus, a tract of waste land at Wick, consisting of 156 imperial acres, on an improving lease, for thirty-one years, at the yearly rent of L. 31, 6s. The whole of this land has now been brought under the plough, with the exception of about an acre of deep moss, which was not sufficiently dried to admit of being ploughed.

The greater proportion of the lands consists of a strong clay soil, and the remainder of bog or moss; and when the operations were commenced, its only produce was heath and a coarse kind of grass called Bur-grass. With the exception of the mossy part, the land was favourable to culture, and presented no particular obstacles to improvement.

In the course of the autumn and beginning of winter 1824, about 54 acres were ploughed up; in 1825, 30 acres; in 1826, 34 acres; and in 1827, 37 acres of this land. The following statement shews the produce and value of the crops.

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Years.	No. of Acres brought under the plough each year.	No. of Acres in crop in each year.	CROPS RAISED.		Value.		
					£	s.	D.
1825,	54	54	214 qrs. of oats @ 21/4,		228	5	4
1826,	30	66	273 qrs. of oats @ 30/8,	£418 12 0			
		14	Turnips @ 75/ .	52 10 0			
		4	Potatoes @ 120/ .	24 0 0			
		84			495	2	0
1827,	34	93	371 qrs. oats @ 21/3,	£395 14 8			
		16	Turnips @ 75/ .	60 0 0			
		4	Potatoes @ 120/ .	24 0 0			
		5	Tares @ 75/ . .	18 15 0			
		118			498	9	8
1828,	37	111	443 qrs. oats, estimated produce, at say 21/4, . .	£472 10 8			
		16	Turnips @ 75/ .	60 0 0			
		4	Potatoes @ 120/ .	24 0 0			
		6	Tares @ 75/ . .	22 10 0			
		18	Hay @ 75/ . .	68 10 0			
					647	10	8
	155	155			1869	7	8

The only manure which was applied to the lands in raising a first and second crop of oats, was a compost of moss and clay, mixed with herring guts, which, from being situated near the fishing-stations of Wick and Pulteneytown, were easily obtained. The compost has uniformly been prepared and applied in the following manner:—The herring guts were carted away from the curing stations each day during the fishing season, which generally commences about the 20th of July, and ends about the 10th of September, and laid down at the most suitable places upon the lands. They were immediately mixed with clay or moss in the proportion of from eight to ten cart-loads of clay or moss to each cart-load of guts. In this state the compost remained till about the middle of December, when it was trenched up; and in about fourteen days thereafter the operation of spreading the compost

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commenced upon the new land which had been ploughed up the preceding autumn. In the application of the compost, particular attention was paid that the part which was prepared with clay was applied to the mossy ground, and that the part which was prepared with the moss was applied to the clayey ground. It was always found to be most advantageous to apply this compost early in the season, as, when delayed till late in spring, and when a tract of dry weather follows, the bad effect produced is very obvious. From fifty to sixty cart loads of compost per acre were generally applied for the first crop of oats, and a fourth part less for the second; in the third year, no compost or other manure was given to the land. The oat seed was sown as soon as the weather proved favourable in spring. The land received no other preparation than being once ploughed as above mentioned, except in some wet places where it was necessary to give it a previous harrowing to fill up the deep cuts occasioned by driving out the compost, to prevent the seed from being buried.

The average expense of cultivating an acre in this way may be estimated at about £5, 5s. for the first crop, namely:

1. Ploughing and harrowing, . . .	L. 0	13	6
2. Expense of herring guts, trenching, &c. .	1	10	0
3. Driving out and spreading compost, .	1	3	0
4. Clearing out large stones, &c. . . .	0	10	0
5. Drains, ...	1	10	0
Total,	L. 5	6	6

It is now intended to commence applying lime to these lands, and to bring them under a regular rotation of cropping. These improvements hitherto have been attended with complete success, and a large tract of land which four years ago presented the appearance of nothing but stunted heath and coarse grass, is now changed to corn land and green fields, bearing crops hardly equalled by any in the county.

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IV.—REPORT OF THE CULTIVATION OF WASTE LAND IN THE PARISH OF PENICUIK, MID-LOTHIAN. *By JOHN CARSTAIRS, Esq. of Springfield.*

MR CARSTAIRS of Springfield, Mid-Lothian, has improved, on his own property, 71 acres 2 roods 25 falls Scots measure; one of the divisions of which will be here given, as sufficient to show the manner of his operations. In the summer of 1823, 6 acres 2 roods 5 falls Scots measure, of bent moss, not then worth more than 4s. per acre, were limed at the rate of 40 bolls Linlithgow measure per acre. The soil was from 1 to 4 feet deep of moss. It was ploughed in January 1824, and sown in the beginning of March following with Burbachly oats, and in the beginning of April with ryegrass and How's grass-seeds without being harrowed in. The produce was L. 4 per acre. In the summer of 1826 it was again limed at the rate of 40 bolls per acre, and ploughed in December 1826. It was sown with Early Angus oats during the last week of February 1827, and in the end of March with ryegrass and How's grass-seeds. The oats were sold by public roup at from L. 4, 10s. to L. 8 per acre, averaging about L. 6, 15s. per acre. The hay crop averaged 300 stones per Scots acre, worth about L. 6.

Value of Produce per acre.

Oats in 1825,	L. 4	0	0
Pasture in 1825 and 1826,	3	0	0
Oats in 1827,	6	15	0
Hay in 1828,	6	0	0
Carry forward,	L. 19	15	0

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Brought forward,				L. 19	15	0

Deduct Expenses.

Ploughing one acre,	L. 0	10	0			
Lime, 40 bolls of shells in 1823, at 1s. 8d.	3	6	8			
Driving the lime at 1s. per boll,	2	0	0			
Spreading ditto from the carts,	0	10	0			
Seed oats,	1	0	0			
Harrowing,	0	2	6			
1 bushel of rye-grass seed 2s., and 2 bushels of How's grass-seed 2s.	0	4	0			
Lime, 40 bolls of shells in 1826,	3	6	8			
Driving ditto,	2	0	0			
Spreading lime, it being lying in heap,	0	1	8			
Ploughing,	0	10	0			
Rye and How's grass seeds,	0	4	0			
Seed oats, Early Angus,	1	9	0			
Harrowing,	0	2	0			
Sowing seeds,	0	1	8			
Five years' rent of moss, at 4s. per acre,	1	0	0			
				16	8	2
Profit upon one acre,				L. 3	6	10

This field, in place of 4s. per acre as above mentioned, is now worth L. 2 per acre.

V.—REPORT OF THE CULTIVATION OF WASTE LAND IN MAINS OF FEDDERAT, PARISH OF NEW DEER, ABERDEENSHIRE. *By Mr WILLIAM YULL.*

MR YULL, has improved about 55 acres of waste land, Mains of Fedderat, in the county of Aberdeen. This waste land consisted of deep moss, a great part of which

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had been cut up for fuel, having peat-banks, holes, and pots filled with water; and of boggy and moorish ground, in winter generally covered with water, and producing rushes, bent, and heath, intermixed with a coarse and scanty herbage, upon which a few stunted cattle subsisted in summer. Two years previous to the period of commencing the operations of improving this waste land, the greater part of it was divided into fields by means of open ditches, these having been laid out in the best manner for carrying off the surface water, and the water of covered drains to be afterwards made. In 1823 the improvements commenced, and in each year afterwards a division or field was brought under cultivation. The field improved in 1824 is here given as a specimen of the manner in which these operations were conducted. It extended to 17½ acres, consisting of moss and marshy ground interspersed with bogs and springs. Drains were cut to the extent of 1808 yards, 5 feet in depth, having an eye or conduit of 5 inches square, filled with stones to the depth of 2½ or 3 feet, and covered with turf. From the subsoil being a thin spouting clay, it was found necessary to causeway the bottom with stones before building the eye or conduit, which added considerably to the expense. The whole amounted to L. 61, 5s. 4d. These drains rendered the field completely dry and fit for tillage. On account of the surface being very uneven, it was found necessary to cultivate 10 acres of the field by the spade, the levelling and digging of which cost L. 2 per acre. This field was sown with oats in 1825, and again with oats in 1826. The produce in 1825 was 2½ quarters per acre, and in 1826 it was fully 3½ quarters. After removing the crop of 1826, 9 acres of the deepest moss were covered with clay, laid on at the rate of 600 cart-loads per acre; the expense of putting it on was L. 36, 9s.; and the total expense of improving the field was L. 117 : 14 : 4. In 1827, 10 acres of this field, after a fair dunging, produced a fine crop of turnips worth L. 5 per acre. The remaining 7½ acres having been summer-

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fallowed and dunged the spring after, the whole field was sown in 1828 with oats and grass seeds, and produced fully ¾ quarters per acre of fine oats, with the appearance of a close and excellent bottom of young grass.

After the drainage of the field had been completed, a strong top-dressing or rather covering of clay and gravel, to the extent of from 300 to 600 loads per acre, has invariably been laid upon the moss when that stuff could be obtained. This compost consisted of the stuff thrown out of the bottom of the drains and ditches, and of clay and mould from the end ridges of the field, which it was found necessary to reduce in order to permit the surface water to run off freely. The mixed soil thus formed by the moss, clay, gravel, and mould, has been found highly favourable for the production of oats, grass, and turnips. When this method has been adopted, the young grass has been highly promising, the colour of a deep green, and the leaf broad and luxuriant. On the other hand, when such a method has not been followed, the deficiency of the crops has been perceptible at first sight.

VI.—REPORT OF THE CULTIVATION OF WASTE LAND AT LIGHTSHAW, AYRSHIRE. *By Mr J. W. Murray.*

Mr Murray*, Lightshaw, Ayrshire, has improved two fields during the period in question. The first of these fields, which contains 14 acres, was a smooth green moor, from 1131 to 1256 feet above the level of the sea at Ayr. The principal herbage which composed its sward, were the turfy club-rush (Scirpus cæspitosus), white bent (Nardus stricta), cotton grasses (Eriophora), with some very short fine heath (Calluna vulgaris), a few of the bent grasses (Agrostis);

* The silver medal was awarded in this case, the conditions prescribed not having been entirely fulfilled.

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and where cattle had chanced to drop their excrements, a few stalks of the festuca, holcus, and poa grasses. The soil was a soft peat of a light-brown colour, from one to three feet deep, very full of what is commonly called Ket (roots of the Scirpi and Eriophora). The subsoil was a soft clay of a drab colour, deeply intersected by the decayed roots of sprats (Juncus articulatus), which, it is probable, had been the principal herbage before the moss had risen too deep over it. The only earthy or metallic salt which could be detected in the subsoil, was sulphate of alumina.

This field was limed at the rate of 225 imperial bushels of lime shells per acre, put on in the month of May and June 1823, and spread as soon as it was a little slacked. It was ploughed early in the winter following, and sown about the middle of February, with a quantity equal to six imperial bushels of early oats to the acre, without any harrowing, and the season keeping favourable, the crop was good. This field was again ploughed the following winter, and sown down with oats and grass seeds, also without any harrowing. The oats were a fine crop; but the grass was eaten by sheep till the beginning of May, which hurt the hay crop much. It, however, turned out better than could have been expected, and averaged about 30 cwt. per acre. The land, whilst in its natural state, might be worth from 2s. 6d. to 3s. per acre of yearly rent; whereas, last year, it was let to be pastured by cows at a rent of about 50s. per acre.

The other field, containing 24 acres, was also smooth green moor; from 1110 to 1230 feet above the level of the sea. The principal herbage which composed its sward were the stool-bent (Juncus squarrosus), blown grass (Melica coerulea), blae-berry (Vaccinium myrtillus), white bent (Nardus stricta), heath (Calluna vulgaris), tormentil (Tormentilla officinalis), with some of the mosses, chiefly hypna and sphagna, and a few of the bent grasses (Agrostis), thinly intermixed. The soil was a dense peat, of a black colour, which, when cut and dried, made excellent fuel. The subsoil was a po-

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rous clay of a drab colour, inclining to yellow, interspersed with streaks of brown, slightly impregnated with sulphate of iron.

This field was limed at the rate of 270 imperial bushels of lime-shells per acre. The lime was laid on in the months of May and June 1824, and spread as soon as it was sufficiently slaked. It was ploughed early in winter, and sown in February; and the produce was a fair crop. It was again ploughed for a second crop, and sown down with grass seeds. Where it escaped the ravages of the grub the produce was excellent; but the greater part was eaten up by these destructive animals. The expense of reclaiming land varies so much with the nature of the soil, and the locality of the particular place, with reference to manures and the like, that no particular outlay on one can form a comparison with another. The exact cost on the above fields, previous to their being ready for the sickle, was for the former L. 3 : 17 : 3, and for the latter L. 4 : 5 : 11; but both lime and coals were on the farm. Harvesting, leading, and stacking cost 18s. 6d. per acre. Ploughing and sowing the second year cost L. 1 : 12 : 6; harvesting, leading, and stacking L. 1, 4s. The grain was of an inferior quality, and was chiefly used for the horses, or bruised in the mill, and boiled for cattle. But the produce might average about 30 imperial bushels per acre for the first crop, and 40 for the second,—say 70 bushels, worth from L. 7 to L. 8. The foggage of the corn and hay stubble during the three years the land was in crop, was worth more to the cattle than all the three years would have been if in the natural state of pasturage. In both of the cases above referred to, two crops of oats were taken in succession; but it is conceived, that a better rotation, under such circumstances, would be to sow down the first crop with grass seeds; to mow it one or two years; pasture it two or three years; and again take a crop of oats. In the course of liming these fields, when first ploughed out, any parts that happened to

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be missed, were not improved in any degree by the above rotation. Dung was also tried as a substitute for lime, but without any beneficial effects. Where the height is very high, the surface smooth, and the moss soft, and where the latter admits of being drained, either by sheep-drains or by the plough, liming on the surface, without ploughing, is the cheapest, surest, and most permanent improvement. The objection, that this method is longer in coming into operation than that of ploughing and sowing down with grass seeds, is more apparent than real; for the first changes produced by the lime are on the natural herbage, which immediately becomes more luxuriant in growth as well as more succulent, palateable, easier of digestion, and much relished by cattle of all kinds. When only a small part of a field is limed, and the rest left in the natural state, the cattle eat up every thing which grows on the limed part, to the very roots; so that, to a superficial observer, it appears as if the lime had extirpated the natural vegetables altogether.

VII.—REPORT OF THE CULTIVATION OF A TRACT OF WASTE LAND IN THE PARISH OF PETERHEAD, AND COUNTY OF ABERDEEN. *By Mr* RODERICK GRAY.

General Observations on the Improvement of Waste Land.

If it be admitted that agriculture is not only the most ancient, but the most useful, of all arts; that it is absolutely necessary for the support of human life; that nations in all ages never flourished so much as when they attended to it; that the strength, prosperity, and independence of a nation, must always depend upon the number of its inhabitants, and the means it possesses of maintaining them from the produce of its own soil; and that where agriculture is prosperous, the

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arts and commerce are extended, but that, where the earth lies uncultivated, there the arts and commerce are destroyed;—every acre of barren, waste, or uncultivated ground which may be brought into tillage, must be a general advantage. It therefore appears not a little extraordinary, that so much waste land remains in this country, when it is taken into view that the population is so much increased, and employment so difficult to be obtained, that many are induced to leave their native country, to go and cultivate barren lands in other regions, under great disadvantages, while thousands of acres which might be brought into tillage at as little expense, and as little labour, lie uncultivated in their own country. But, to the improvement of waste lands in this country there are many obstacles,—among which may be mentioned entails, liferent-rights, short leases, and an expectation on the part of landlords, when it is proposed to them to bring in a piece of barren ground, that they should receive an immediate rent, although the land may have brought nothing to them or their predecessors.

While entails exist in their present shape, they must continue prejudicial to agriculture, unless the Legislature shall think fit to authorise heirs of entail to grant such leases of waste land as would hold out a prospect to those willing to undertake to bring them into a state of tillage, of being ultimately remunerated. Were proprietors of entailed estates authorised, where the lands are barren, to grant sufficiently long leases, and were they inclined to benefit their successors, it may be reasonably supposed, that, in less than half a century, many entailed estates would be double their present value. Thirty years is by no means a sufficient length of lease to enable a tenant to take in a tract of barren land. From 50 to 90 years, at a very moderate rent, would be required in many cases. With regard to proprietors whose estates are not entailed, many of them are giving such encouragement, by length of lease or otherwise, as is necessary to enable

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their tenants to bring into cultivation such parts of their lands as are waste; while others cannot bear the idea of allowing their estates to be improved unless they derive an immediate advantage, although the expense of improvement may be nearly equal to the fee-simple of the lands to be reclaimed. A considerable spirit of improvement has existed in the country for the last thirty years, and, it may be assumed, that, during these thirty years, in some parts of Scotland, the produce of the soil has been more than doubled, in consequence of the improvements and discoveries made in agriculture, and the bringing into cultivation of waste lands; and, were sufficient encouragement given, and proper methods adopted, it is not improbable that, in the course of other thirty years, a very great extent of lands, at present totally unproductive in themselves, and pernicious to the cultivated grounds around them, might be brought into cultivation. The encouragement necessary to be given must in all cases depend upon local circumstances, especially the nature of the soil, and the distance from the means of improvement.

The writer has, for the last twenty years, occasionally directed his attention to the cultivation and improvement of waste land, as well as to the improvement of lands previously in tillage; and he will now shortly state the result of his experience, although he has reason to believe that he has little new to say upon the subject.

In cultivating waste lands, or in improving lands which are already brought under the plough, but are capable of being made more productive, the first thing to be attended to is, To open up the lands, by making a sufficient road through them, and from this road branches to each field: 2dly, To drain the lands effectually. These operations are expensive, but are essentially necessary; and, upon the perfect execution of them the success of the after operations will depend,

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as it is evident that without roads manure cannot be brought to the ground, nor the produce be carried from it, and that without drains the soil cannot be improved. In general, roads and drains, when made by tenants under leases of any ordinary duration, are very imperfectly executed; for they are attended with more expense than it can be expected a tenant will lay out, as, in most cases, he could not expect to be remunerated during his lease. This being the case, landlords would find it to their advantage to be at the expense of roads and drainage, and to have them executed in a perfect manner, previous to letting the lands, or during the lease; and, in either case, the tenant could afford to pay the interest of the sum expended; and thus the landlord would, in many cases, enable his tenants to double the value of their farms in the course of a nineteen years' lease. Where, therefore, waste land lies interspersed among cultivated grounds, the landlord should be at the expense of making roads through it, and draining it completely, and then let it along with the arable land; taking the tenant bound to improve and bring it into tillage within a certain period; and stipulating that, if it be not brought into cultivation within the time limited, the tenant shall pay an additional rent, during the remainder of the lease, for each acre not brought into tillage. Again, Where a proprietor has a tract of barren, adjoining to cultivated, lands, he should, if he wishes to improve it, open it up, by making roads, and drain it effectually at his own expense; and then take the adjoining farmers bound to improve a certain space each year of their leases, and to pay a proportion of the interest of the expenditure upon roads and drains. Where the lease is short, and the improvement difficult, the landlord, in order to enable the tenant to proceed, would require either to give a premium, or to advance a sum per acre at interest, (the principal not to be repaid).

In cultivating bogs and quagmires, the first operation to be performed is to drain them sufficiently; after the drainage

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is completed, to allow the soil to subside and consolidate, until it is capable of bearing the weight of horses or oxen to plough it up; and in order to expedite this, it will in general be necessary, after the main drains or ditches are completed, to lay off the bog or quagmire into spaces of the ordinary size of a ridge, and to cut drains between each of them from 1 foot to 18 inches in depth. If the main drains are well executed, and the bog is not very deep, it will be sufficiently consolidated in the course of two or three years; and during these two or three years, the natural grasses will be of considerable value, as, in consequence of the drainage, some of the coarser grasses will decay, and others of better quality grow in their stead. It may then be ploughed in autumn, to the depth of about 3 inches, with a sharp plough, and the sward be allowed to rot by the frosts in winter. In the spring, part of the surface may be burned; and the ashes, or rather, if they can be procured, lime, shell-sand, soil, or other manure, spread upon the surface; and, thereafter, a crop of oats may be sown, with a fair prospect of a moderate return. As the sward will require two or three years to rot it sufficiently, two or three successive crops of oats may be taken with advantage, after which, it should be either fallowed, or cropped with turnips or potatoes, and sown out to grass with oats. After lying two or three years in grass, it may be managed in the same manner as other cultivated lands. In the event of its not being properly consolidated to admit of being ploughed, or if it is an object to obtain a grain crop as soon as it is drained, it may with advantage, and perhaps at as little expense, be delved; part of the sods may be burnt, the ashes spread over the surface, or lime, shell-sand, &c. applied, and the ground may then be sown with oats. In this case, little, if any, harrowing, is necessary, as the seed will fall down between the furrows, or among the sods, and take root. In some cases, bogs may admit of the first crop being potatoes, turnips or grass, where there is not a very rough sward.

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There are two ways of bringing a moor into tillage,—*1st*, By trenching with the pick and spade; and, *2dly*, By the plough. There are some cases in which trenching is the only method that can be resorted to. There are some objections, however, to trenching land, and among these the following have occurred to the writer:—*1st*, In most situations, the upper stratum of waste land is moorish land, gravel, stones, or moss, with an impregnation of iron. It extends in depth from 2 to 18 inches. Between the first and second stratum, is the moor-band or pan, being sand, gravel or stones, so strongly bound together, that it is very difficult to break it; and it assumes, in some instances, the appearance of a piece of sheet-iron. It is from 1-8th of an inch to 4 or 5 inches in thickness, is impervious to water, and destructive to vegetation. In trenching such land, the specification, in general, is to go to the depth of 18 inches, so as to break the pan, and take up a few inches of the subsoil. By this process, it is quite evident that the same moorish soil has been removed only a little farther from the surface, and that it has been interposed between the soil brought from the bottom of the trench and the subsoil; and that, therefore, the subsoil continues as bad as before. In trenching, the stones are brought to the top of the trenched land; and from the loose state of it, there are considerable expense and difficulty in driving them off. *2dly*, The expense of trenching (being from L. 8 to L. 16 per acre *) is so high as to afford no great prospect of being repaid within a reasonable period. From these and other considerations, the writer has, in all cases, avoided trenching, where it was possible to use the plough. In cultivating a moor, according to the experience of the reporter, the first thing to be done is to burn the heath, whins or broom, or otherwise to destroy and remove them from the surface; and this should be done carefully, because the get-

* It is presumed that Mr Gray, in this and other parts of his essay, speaks of rates and prices with reference to the *Scotch* acre.

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ting rid of them afterwards is attended with more expense. Next, To dig up and remove all the stones which can be seen; and these can be removed more easily while the moor-band or pan is not broken. *3dly*, If there is dead or flow moss in heaps or hillocks upon the surface, to level and burn it, taking care to spread the ashes over the ground. The moss may be raised either by the spade or the plough, according to circumstances. *4thly*, To plough with four horses or four oxen, with a strong plough made for the purpose; and this will be most effectually done while the ground is wet in the autumn or spring; for, in autumn, it is often impossible to plough in moor-band soil. *5thly*, After the ground has been ploughed, it should be allowed to remain for not less than a year exposed to the action of the atmosphere and frosts. It will then require to be torn to pieces by the grub-harrow, or other strong harrows prepared for the purpose. *6thly*, After being harrowed, any stones which have appeared in the course of harrowing will have to be removed. It will then require to be cross-ploughed, and again harrowed, and the stones will fall to be removed. In most cases, it will, after these operations, be ready for being dunged, limed, and ploughed, for a crop of oats, turnips, or potatoes. If the first crop is oats, the land should be sown out with grass seeds, and pastured for two years. It should then be manured with compost, sea-ware, ashes, or other manure, and another crop of oats should be taken. After this crop, it should be prepared for turnip, and, after turnips, sown out with grass-seeds among oats, and then allowed to remain in pasture for not less than three, nor more than four, years. If the first crop is turnips or potatoes, the next crop should be oats with grass-seeds, and the land ought thereafter to be pastured for three or four years. In some instances, the reporter has taken a crop of oats upon the first breaking up of the land, in order to reduce the heath and sward; and next year either fallowed the land, or prepared it for a crop of turnips, as circumstances

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admitted. The advantages of ploughing barren land instead of trenching it, are,—1*st*, That the expense is less; 2*dly*, That the upper stratum and the subsoil are more intimately mixed; 3*dly*, The first and second strata being mixed and exposed to the action of the atmosphere, the pan or moor-band is in a great measure destroyed; whereas, by trenching, it is only removed a little farther from the surface. While bringing into tillage waste land, the following points should be attended to:—1. To obtain a proper depth of soil from 9 to 12 inches; 2. To apply at once a sufficient quantity of lime and manure, not less than from 20 to 30 bolls of lime-shells, and 40 to 50 cubic yards of manure per acre; 3. To take care not to exhaust the land by over-cropping. No more than one crop of grain should be taken without the intervention of a green crop; and after the land is laid to grass, it should not be again broken up, as long as it affords tolerable pasture. When it is broken up from grass, it should be previously dunged with compost ashes, sea-ware, or other manure. When first in grass, it should be pastured, and no part of the grass be cut for hay. The crops should be so arranged, when barren land is to be brought into tillage, without being attached to cultivated lands, as to have, as soon as possible, a fair proportion of turnips, potatoes, oats, and pasture; and this may be easily effected by adopting the various ways of cropping before mentioned.

Burning of Barren Land.—A great deal has been said and written for and against burning moss and barren land, and with a great deal of truth upon both sides; for, in some cases, burning appears to be highly beneficial, while, in others, it is very pernicious; and therefore it becomes of some importance to discriminate in what cases it is advantageous. It cannot be denied, that a great extent of ground that otherwise must, from its distance from other manure, have remained barren, has been reclaimed by burning; and it

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must be admitted that ashes are a manure which will produce one crop at least, either of oats, turnips, or grass; that the crop raised by means of ashes, will produce a certain quantity of manure; and therefore in remote situations, and where neither lime nor dung is to be purchased, ashes come to be of great value, as the crop raised by them lays the foundation, by producing other and more valuable manure. Although at no distant period, burning was, in some cases, prohibited under severe penalties, it is now again coming into use; and was, in ancient as well as more modern times, known as a profitable means of improving barren land. Indeed Virgil seems to have been acquainted with its advantages, when he says,

"Sæpe etiam steriles incendere profuit agros,
Atque levem stipulam crepitantibus urere flammis.
Sive inde occultas vires, et pabula terræ
Pinguia concipiunt: sive illis omne per ignem
Excoquitur vitium, atque exudat inutilis humor;
Seu plures calor ille vias, et cæca relaxat
Spiramenta, novas veniat qua succus in herbas;
Seu durat magis, et venas astringit hiantes;
Ne tenues pluviæ, rapidive potentia solis
Acrior, aut Boreæ penetrabile frigus adurat."

GEORGICS. *Lib.* 1. *from 85th to 93d line.*

Virgil does not maintain that it is always beneficial to resort to burning, in the case of barren lands, but that it is often so; and the majority of writers, since his time, have, under certain limitations, approved of burning barren lands; and therefore it has the experience of ages on its side, although it must be admitted that it may be injudiciously used. The reporter will mention a few of the cases, in which he thinks that burning may be resorted to with advantage. 1*st*, Where the dead or flow-moss, heath, or moorish soil upon the surface is inferior in quality to the subsoil, it is evident that it ought to be burned, because it is the cheapest way of getting rid of it. The ashes act as a manure capable of producing a crop. The subsoil is laid bare; the pan or moor-band, between the surface and the subsoil, is in

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some measure destroyed by the heat; the operation of ploughing is rendered comparatively easy; a better soil is turned up than otherwise could have been; and this soil is rendered at once productive by the application of the ashes upon the top, which are incorporated in ploughing. *2dly*, Where there is a considerable depth of moss, without vegetation upon the surface, the cheapest and easiest method of bringing it into cultivation, is by paring and burning; and, in this case, the operation may be continued for years with advantage, if it be previously ascertained that, when the moss is exhausted, the soil below it is of such quality as to make good land. *3dly*, In every case where a moor or moss is to be cultivated, the first operations are much forwarded by burning; and, according to circumstances, it ought to be employed. Where the surface is a sward or bent, or where there is a great deal of vegetable matter in it, burning should be used sparingly, or rather should be dispensed with; and lime or shell-sand, or mould from the adjoining fields, or sea-weed, or in fact any substance that will bring the surface into a state of decomposition, should be applied to it. Burning, in this case, would be attended with disadvantage, by at once destroying the vegetable matter, which, when decomposed, becomes the best part of the soil. Where there are large heaps or hillocks of moss and sward, these may be burnt with advantage in kilns, and the ashes be carried to the adjoining lands. Where there is not a sufficient depth of soil, or where the subsoil is inferior to the surface-soil, the reporter is of opinion that burning is not to be resorted to; and that, in all moorish soils, and in moss soils, after dung has been applied, burning should be dispensed with. Upon the whole, where lime and other manure are to be had, burning is not so necessary; but, in remote situations, it is of the utmost importance in improving waste lands; and, by it alone, much land has been, and may yet be, reclaimed. It is no doubt true, that moss may be converted into a valuable manure, by being decomposed by lime, stable-yard dung, sea-weed, and other substances; and,

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where these can be had, and where there is only a limited quantity of moss, this is the best method of using it. But, in many situations, the parties improving waste land have only the moss; and therefore they have no other way of using it as a manure, but by converting it into ashes; and, when the straw produced by the ashes is converted into stable yard dung, then they may resort to compost dunghils with advantage. In burning the surface of barren lands, the moss, or other stuff, should be exposed to the action of the air as little as possible; and as soon as it is reduced to ashes, the ashes should be covered up, and kept dry, until they are ploughed into the land. In fact, the moss should be rather charred than burnt; as, when it is too much burnt, the more valuable parts are dissipated; and, when ashes are exposed on the surface to the rains and the action of the atmosphere, they become inert, and have little effect upon the soil.

Draining.—The reporter has had a good deal of experience in draining the estates near Peterhead, belonging to the Governors of the Merchant Maiden Hospital of Edinburgh, upon which he has been one of the factors since the year 1811. These estates extend to about 8000 acres. Previous to the year 1811, no drains of any importance had been cut, and there were not upon these estates many fields that were not in want of them. For some years, the reporter had the benefit of the advice and assistance of an eminent agriculturist in carrying on the improvements upon these estates; and he will shortly state the manner of proceeding adopted, although he is not aware of having discovered any thing that was not previously known. The subsoil of these estates is, for the most part, clay, gravel, moss, small stones, or a mixture of these; and, at various depths, there is generally a stratum of sand or gravel, strongly impregnated with iron, and so hard and compact as to be impervious to water. The reporter has found three or more of these strata, at considerable distances

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from each other. There was also a pretty large extent of bog, moor, and waste land, interspersed with the arable; and in some places, the estates were so much injured by water in the subsoil, as to render the land, comparatively speaking, of little value.

Before proceeding to drain, it became necessary, in the first place, to make roads through the lands to enable the tenants to drive materials; and, in the second place, to level the old and irregular fences, and to lay off the lands into proper farms, and these farms had to be divided into fields, according to the rotation of crops to be adopted on each. These preliminaries having been accomplished, the next object was to proceed with the drainage. Here the reporter may observe, that it is of the utmost importance, and is attended in the end with the least expense, to make the roads in the best manner, viz. to take care that sufficient drains and side-ditches be made to keep them dry at all seasons; and that, in other respects, they shall be made equal to turnpikes, unless in so far as regards breadth of road-way; and that great pains should be taken in laying off the fields, so as each may be as nearly square, and of equal size, as the ground will admit. Proper attention to these preliminaries is of great consequence, as it is not easy to rectify them afterwards, without incurring much greater expense, besides protracting the other improvements.

In executing the drainage, it became necessary not only to get rid of the water confined in the soil, but also to provide for clearing the lands of that on the surface. Both these objects were kept in view in every case; and, therefore, open or main ditches were cut in all situations where they were necessary to receive the water both from the sunk drains and the surface. These ditches were, for the most part, either between farms or between fields, and generally in hollow grounds rising on both sides. In such situations, it became of importance, while draining, to enclose also. Wherever,

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therefore, the main drains happened to divide fields, two ditches were made from five to six feet wide at top, two and a half to three feet deep, nine inches in width at bottom, and having a space of five feet between them, and upon it the stuff taken from both ditches was laid in such a manner as to form a mound, with a bed for planting thorns upon each side. These ditches, from their situations, while they were calculated to receive both the surface water and the water from the sunk drains, contributed in many instances not a little to the drainage of the subsoil.

The covered drains were cut according to the indications of water on the surface; and the general rule adopted was to cut at right angles, or across the spring or sink where it made its appearance; and from thence to cut one or more runners at right angles, or nearly so, with the drain to the nearest ditch. The depth of the drains varied, according to circumstances, from four to fifteen feet. They were all built upon the sides, paved or shoed in the bottom, and covered on the top with stone. The size of the water-way varied from six inches square to two feet square, according to the quantity of water to be discharged. The reporter is of opinion, that, in many cases, a very considerable expense would be saved if drains were made deeper than they generally are, if more attention were paid to having them well built, and if a proper quantity of small stones, not less than two feet, were put above the syver or water-way, and the tops of these stones were covered with turf, clay, straw, heath, rushes, &c. Not only would a saving of expense be thus effected, but the drainage would be more effectual; for, in many situations, one deep drain will do more good, and be executed at much less expense, than a number of shallow ones. It would be impossible to lay down any general rule for the depth of drains, as in every case it is necessary to judge from circumstances. In most cases, sunk drains should not be under six feet in depth. In draining upon the face of

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a sloping bank, the reporter has required to go to the depth of from six to twelve feet, in order to dry the ground to the termination of the slope; and, in some cases, to cut parallel drains with runners between them. And in digging drains, he has found three strata, with a pan between each of them; and the water has issued from each stratum—from the first, strongly impregnated with iron—from the second, less so—and from the third, in much greater quantity, and free from iron. In cases where there was a deep bed of clay, and where it would have been attended with great expense to get the drain to the bottom of it, the reporter has seen great advantage from digging holes in the bottom of the drain until these holes reached the water stratum, and then filling them with small stones, or building them on the sides, and letting the water rise to the bottom of the drain.

Drains may be laid off at any time of the year; but the spring and autumn are the most convenient seasons. It is easier to see where they are required, and the proper lines of them, when the weather has been dry for some days previous, as, where there is no water confined in the soil, the surface will soon dry; while, on the other hand, where the soil requires to be drained, there is always the appearance of damp upon the surface. This appearance will be seen better at a little distance than on the spot; and, in general, as before stated, the place which should be cut is between the dry and the wet land, as if to divide them from each other, and to intercept the water which had before risen to the surface, and convey it from the bottom of the drain by a runner from the main drain or ditch. After sunk drains have been built, it is of great consequence to keep the mouths of them open; and, for this purpose, at least once in two years, to scour the main ditches into which the water runs from the sunk drains.

It appears to the reporter, that it would tend to the interest of proprietors, were they to employ proper persons to

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superintend the whole operations of draining and building fences, and afterwards of keeping them in proper repair; for, in many cases, if these operations are left to be done by tenants, they will be imperfectly executed, either from a want of knowledge of the plans proper to be followed, or from a want of time to attend to them and the other operations on their farms. If a proprietor, having an estate to improve by drainage, roads and fences, were to engage persons skilled in these operations, he would get them done at less expense, and in a better and more substantial manner, than by taking the tenants bound to do them; and, were he afterwards to employ proper persons to scour the ditches, and repair the fences, he would find them in better order than when they are left to be cared for by the tenants. The tenants could, in such case, afford to pay a per-centage upon the original expense, and upon the annual expense of scouring and repairing, or such part of the latter as might be agreed upon; and thus these improvements would benefit the estate more than they generally do.

The drains made upon the estates under the charge of the reporter, at the expense of the proprietors, during the last 17 years, have answered the purpose for which they were intended; and, as far as he knows, have not failed in any one instance. During these 17 years, the rental has been more than doubled, while the condition of the tenants has been made better.

The reporter having stated such observations as have occurred to him in regard to the cultivation of waste land, will now refer, more particularly, to the tract to which this report is meant more especially to apply.

Account of Improvements made on the Estates of Auchtygall and Collilaw.

The estates of Auchtygall and Collilaw, belonging to the Governors of the Merchant Maiden Hospital of Edinburgh,

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are situated, as before mentioned, in the parish of Peterhead, and county of Aberdeen. The tract of waste land more particularly now to be adverted to, is from three to four miles distant from the sea-port of Peterhead. These estates were let in 1811, upon improving leases, except the tract of bog and hill ground, which extends to about 470 acres, Scotch measure. This tract was partly a common; and, except in so far as regarded peat and turf, for fuel, was considered of little value, had never brought any rent. The tenant of the adjoining farm was offered a lease of it at 6d. per acre, but he declined to take it. In dividing that part of it which was common, the part which fell to the Hospital was valued at 6d. per acre, and in previous valuations it had been estimated at 4d. per acre. In 1809, a gentleman, employed by the Governors to examine and report upon their estates in Aberdeenshire, in reporting upon this tract, observes: "The hill is very worthless, and *bids defiance to the operation of the plough*. If the turnpike road from Aberdeen, or a branch of it, is brought forward through this moor, it may be worth while to let out stripes of about 4 acres, on building leases of about 90 years; and in time, part of it may be improved by manual labour. The common hill is so poor, as scarcely to be worth the expense and trouble of a division."

These hills had been, at some remote period, covered with moss and wood. In some instances, the wood had existed before the moss, and the moss had been formed from it. In others, the wood had grown in the moss. This is proved by the roots of the trees being found generally in the subsoil below the moss, but at other times in the moss at some distance from the subsoil. Latterly, the greater part of the moss having been removed for fuel, this tract was covered with flow-moss, heath, or flint. In the hollows, there were many springs strongly impregnated with iron; and from the accumulation of moss, and other stuff, these hollows had become quagmires, producing the coarse aquatic grasses. In

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some places, the heath had grown to a considerable height. In other places it was short, and in detached bushes or clumps; while the intermediate spaces were covered so thick with flint *, and other small stones, as to resemble very much the sea-shore. Below the surface, and appearing above it, there were many stones of considerable size, chiefly granite. There was no grass, or other plant, except upon the bogs or quagmires. In fact, the surface, or first stratum below the moss, varying from 2 inches to 1 foot, consisted of gravel, flint, or sand, held in adhesion by iron, and so hard as not to be easily penetrated by the spade or pick, and of such quality as to render it unfit to support the vegetation of grass or other plants. From the nature of the stratum, it was impervious to water, and, therefore, in dry seasons, incapable of retaining it. It was divided from the next stratum by the pan or moor-band before described, which in some cases, as before stated, resembled very much a piece of sheet iron. This pan, when exposed to the air, oxidizes, loses its adhesion, and moulders into dust. There were in some places large detached masses of granite, in others indications of continued quarry, and in others great quantities of smaller stones of various kinds, which, when raised, covered the ground all over.

An attempt was made to cultivate part of this tract by means of cottagers or crofters. Accordingly, 5 or 6 acres were let to each crofter. One acre was trenched, and a cottage built at the expense of the proprietors, upon the condition that the tenant should pay interest. Three crofts were let. Notwithstanding the crofters were all active, sober, and industrious men, they had great difficulty in maintaining their families, and were not very successful in their operations. This arose from their not possessing capital, their not being able to pur-

* The occurrence of flint in the diluvium of this part of the country is a geological fact of peculiar interest, there being no chalk deposite, to which flint more especially belongs, in any part of Scotland.—Ed.

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chase nature, the want of roads, the deficiency of employment near their homes, and the great expense of trenching. The mill-dews from the bogs were very prejudicial to their crops, either from damaging them when growing, or rendering them late in coming to maturity; and from their not being able to destroy the pan, unless by the operation of trenching, their crops were very inferior. On consideration of all these circumstances, the proprietors judged it necessary to abandon any farther attempts to cultivate this barren tract by crofters.

It occurred to the reporter that there were quarries of granite on these hills; and the proprietors having given authority to search for them, by opening the ground, he discovered, in the course of this operation, that after the pan or moor-band had been removed, the next stratum was sand or gravel, with an admixture of clay. Quarries were found; and to facilitate the working of them, it became necessary to continue a road leading from Peterhead through the cultivated part of the estates, through the hill to the quarry at the extreme boundary of it. And thus the moor was opened up from one side to the other.

In the course of searching for quarries, and afterwards in making the road, it occurred to the reporter, that, if the dead moss, heath, and stones were removed, it might be practicable to plough parts of the hills by introducing the plough below the moor-band or pan, the more especially as, after removing the pan, the bottom in most places was open, and consisted of gravel and clay to a considerable depth, in such a soft state as to admit of being ploughed. He observed that where the subsoil, in searching for quarries, and in making the road, had become exposed to the action of the atmosphere, grass, and in some places white clover, had begun to grow upon it; and, from these indications, he resolved to make an experiment with the plough.

The cheapest way of making this experiment appeared to

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be to employ those residing in the neighbourhood, as, if it did not succeed, the expense of an establishment would be saved. And the reporter having selected about two acres, covered with heath and dead moss, neither the best nor the worst in the moor, and having procured a very strong four-horse plough, he hired a carter and two horses, and sent a man and other two horses from his own farm in the neighbourhood, and commenced ploughing. Considerable difficulty was experienced from the length of the heath, the inequalities of the surface, and in some places from the depth of the moss. The first ploughing reached in most places to the bottom of the moss, and took up a little of the gravel and moorish soil. In consequence of the plough choking, and the space which the heath occupied between the furrows, this ploughing was very imperfect. The next step was to break the furrows by means of a grubber, or strong iron harrow drawn by four horses, and then to apply the common harrows. The heath and part of the moss were gathered into heaps and burned, and the stones which had appeared at the surface were raised from the soil and removed. It was then ploughed again with four horses. At first the plough ran upon the pan, which it seemed impossible to penetrate, various trials were made, and the plan which ultimately succeeded was to have four men employed at the plough; and these were engaged as follows: viz. One, with a pick and spade, made a hole where necessary, until it reached below the pan, and entered the plough at this hole; another held the plough; the third held down the beam, and kept the plough below the pan; and the fourth took care of the horses. In this way the upper stratum and pan were broken; and afterwards they were brought into a sort of mould by the grubber and harrows. It was then cross-ploughed and harrowed, and the stones were again removed; the ashes were spread over the surface, and 30 bolls of lime-shells, and about 40 loads of manure, were applied to each acre. It was then ploughed into ridges, and sown with

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oats of an early kind. This experiment was made in 1822, and it was towards the end of April before the ground was prepared for the seed. There was, however, the appearance of an abundant crop; but owing to the bogs and mill-dews in the immediate neighbourhood, it was late in coming to maturity, and was considerably hurt. These two acres were sown out with grass seeds among the first crop, and next year there was a tolerable crop of pasture grass.

After reaping the first crop it appeared quite evident to the reporter, that any farther attempt to improve this tract would be abortive, if the whole bogs and quagmires, and such parts of the hills as required it, were not previously drained; and he was brought to the conclusion the rather, because the crops on the farms adjacent to the moor were often seriously injured, and in some seasons never arrived at maturity, in consequence of their vicinity to the bogs. He therefore commenced the drainage, and will shortly state the nature and extent of it.

There are two hills, the one named the Blackhill, formerly a common, and the other the hill of Collilaw. They are divided from each other by a strath or gully; and this strath from the one end to the other was a morass, bog, or quagmire, and in the autumn, winter, and spring was for the most part nearly covered with water, mud, and moss-plants. The water in this bog was partly from the hills, and partly from springs which rose at their base. The first operation in draining this bog was to open a ditch on each side between it and the hard land. These ditches were from 5 to 10 feet wide at top, and from 3 to 8 feet in depth, according to the rise or fall in the surface of the ground; and 1 foot to 1 foot 6 inches wide at the bottom. The ditches were as deep as the bog; and being cut upon each side of it through the springs arising at the base of the hills, and at the same time receiving the surface water from the hills, left the bog between them dry. In consequence, in the course of a year it had subsided and con-

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solidated so as not much to exceed one-half of its original depth. At the end of a year, one of the ditches was deepened and converted into a sunk drain. After it had been divided by small drains or water-runs into ridges, it was delved; part of the surface was burned, and sown with oats for three successive years, and was then laid to grass. In the last of these three years it was ploughed, and next season the reporter intends to apply shell-sand or lime to the surface, and take a crop of oats; and thereafter he means to take a crop of turnips, and then sow it out with grass seeds. The first crop of oats produced a large quantity of straw, but they were long in coming to maturity, and in consequence were injured by the frosts and rains. There were other bogs and quagmires, which were drained, and treated in the same manner; the whole extent of bog-land being from 30 to 40 acres Scotch statute measure.

Having been encouraged by the proprietors to proceed with the drainage of the whole hills and bogs, the reporter has, since the year 1823, made and completed ditches and drains of various sizes, to the extent of upwards of 9000 Scotch ells.

The effect of this drainage has been such as to prevent the injury caused to the neighbouring lands by the mill-dews, and to alter the climate in the hills, so as the crops now arrive at maturity as early as any in the neighbourhood; and here the reporter may be permitted to mention a fact, which has fallen under his own observation, that, in consequence of the drainage which has taken place in the parish of Peterhead within the last twenty years, the crops arrive at maturity from ten to fourteen days sooner than they formerly did. And this fact he thinks is fully established by a comparison of this with other districts of the country.

Adopting the principles detailed in this report, the reporter has, during the years 1823, 1824, 1825, 1826, and 1827, brought into tillage, by means of the plough, from the moors

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and mosses of Auchtygall and Collilaw, and the common of Blackhill, 133 acres Scotch measure, or 166 acres imperial standard measure; and he has limed the whole extent at the rate of from 20 to 25 bolls of lime-shells per acre, each boll containing 4 imperial bushels, and applied other manure at the rate of from 30 to 40 cubic yards per acre. This manure was composed of garden mould and rubbish of houses from Peterhead, herring guts, whale refuse, sea-dogs, stable-yard dung, scourings of ditches, salt, cleanings of the streets, mud, and other stuff deposited in the harbours of Peterhead, moss composts, ashes from moss, and other substances. These being variously mixed and fermented have made tolerably good manure, and have raised fair crops of turnips and oats. The reporter has found great benefit from transposing moss, clay, and gravel from one part of the ground to another, according as the transposition tended to improve the soil. For instance, he has transposed gravel or clay to moss, and moss to gravel or clay.

The crops of 1823, 1824, 1825, and 1826, were chiefly first crops from the moorish soil, and seldom exceeded from three to four returns, except upon particular spots, where there might have been about five returns. The crop of 1827 was partly from newly broken-up land, partly from grass, and partly from land which had been taken in from the moors, and had borne a crop of turnips in 1826. In all, there were 30 acres in oats; and the gross produce was 1111 threaves, which yielded 195 bolls, being, at an average, 6½ bolls per acre, old Aberdeenshire measure. There were 8 acres in turnips, and the crop was nearly equal to the crops from old lands in the neighbourhood. There was a small patch of potatoes which succeeded well, and yielded a fair crop; and about an acre of rye upon gravel, where an oat crop had failed before. The rye succeeded, and was a fair crop. During the winter of 1827–8, 4 horses, 2 cows, and 23 cattle were maintained from the produce. The only thing that was deficient was hay,

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which the reporter had to bring from his other farm in the neighbourhood.

This season, 1828, there are 30 acres of oats, 1 acre of rye, 14 acres of turnips, and 2 acres of potatoes. The oats have turned out a fair crop, with the exception of two fields, taken from the moor, which were hurt by the long continued droughts. The turnip and potato crops are equal to any of the same kind in the neighbourhood. The ground is completely covered, the plants have a healthy appearance, and the potatoes, of which the produce is about 30 bolls per acre, are of a large size.

There are quarries of excellent granite in these hills. They are wrought by the reporter and others, and yield blocks of large size, from 1 to 16 tons; and, at times, pillars might be had from these quarries from 10 to 16 feet in height.

The reporter has established trysts for the sale of horses, black cattle, and sheep, upon these hills. They are held four times in the year, and are likely to be well attended, and to prove of benefit to the adjoining district.

In proceeding with the improvement of these hills, the reporter had, for the first, second, and third years, to purchase a considerable quantity of fodder. Indeed, at first he had every thing to purchase; and, therefore, he kept no more stock than was absolutely necessary.

The reporter built houses as they were required, and has now a complete steading, viz. a dwelling-house for the servants, a stable for four horses, byres capable of containing 40 cattle, a barn and threshing-machine, cart shed, &c. These are built in the form of a long square, having the dung-court in the centre, and are all covered with heath instead of thatch.

The expenses incurred in draining, burning, ploughing, removing stones for lime, dung, and other manure, and for enclosing, are from L. 6 to L. 12 per acre: that is, some parts have been brought into cultivation for L. 6, while others have cost L. 12 per acre.

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ON THE IMPROVEMENT OF THE SYPHON FOR DRAINING QUARRIES. *By J. Stewart Hepburn, Esq. of Colquhalzie.*

I observe among the miscellaneous notices of the First Number of the Quarterly Journal of Agriculture, page 113, an account of an improvement of the Syphon by Mr Cowan, consisting of a box placed at the upper part of the syphon, for the reception of the air which is disengaged from the water rising under diminished atmospherical pressure, having a valve opening upwards, through which the air is at intervals forced out into the atmosphere, by the action of a forcing pump.

I have no doubt this contrivance will answer the purpose intended, but it has its inconveniences: 1st, In the expense of the pump; 2d, In the power necessary to work it; for, as it is essential that the pump be powerful enough to force the water up into the ascending limb of the syphon faster than the descending limb can discharge it, if either the diameter of the syphon, or the height of the ascending limb be considerable, it is obvious that a forcing pump of great power will be necessary to effect such a pressure upwards on the water in the box, as will open the valve and expel the air; and, 3d, there are no means of ascertaining the accumulation of the air so as to know how often it is necessary to work the pump.

I think the object of Mr Cowan's invention may be accomplished, in a simpler and more economical manner, by a method which I shall presently describe. I may premise, that the apparatus I would propose to apply to the syphon is a modification of an air-vessel which I had contrived some years ago for freeing my water-pipes of air. In laying the water-pipes for my house, it was necessary to conduct them across a ridge of ground elevated six or seven feet above the general level of the surface; and as it was apprehended that the flow of the water would soon be obstructed by the disengaged

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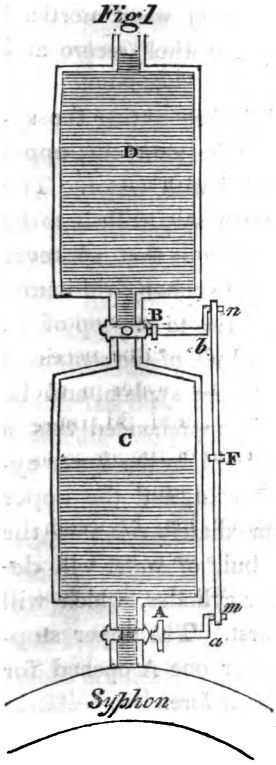
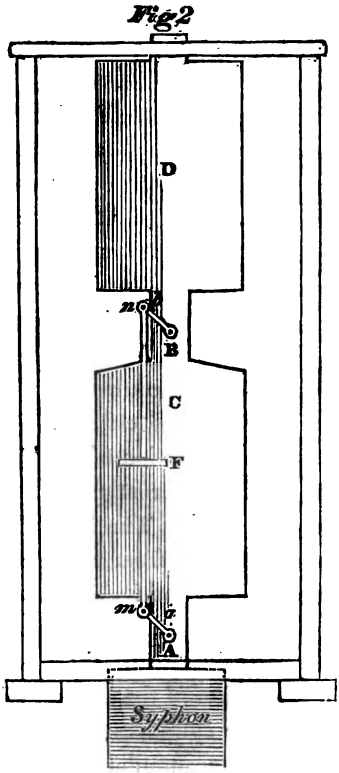
air lodging in this part of the pipe, I proposed to insert into the water-pipe, at the summit of the ridge, a vertical pipe with an air-vessel at the surface. My plumber, Mr Mackie of Perth, was of opinion that it would answer the purpose; but it so happened, that having occasion for materials to embank a hollow, I cut a channel through the ridge of ground, which rendered the air-vessel unnecessary, and it was accordingly dispensed with.

The apparatus I propose to apply to the syphon is as follows:





Into the vertex of the syphon I would insert a short pipe of cast-iron, brass, or strong cast lead, 4 inches long, or

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any greater length, which local circumstances may render convenient, and 1 or 1¼ inch bore, containing an air-valve or stop-cock A. The upper end of this pipe is inserted into the bottom of a cylindrical vessel C of iron or copper, proportioned to the size of the syphon: I shall suppose 6 inches in diameter and 12 in height. Into the upper end of this cylinder I would insert a similar pipe, containing a stop-cock B; the upper end of this second pipe being inserted into the bottom of a second cylinder D, of the same dimensions, but having at its upper end a neck open to the atmosphere, or loosely covered. This neck may be inserted through a cross-bar of wood morticed into two upright pieces, so as to keep the whole secure and steady. See Fig. 2.

The apparatus being thus adjusted, before setting the syphon to work, the lower stop-cock is to be shut, the upper one open, and *both* cylinders to be filled with water. The syphon being then set to work, the upper stop-cock is to be shut and the lower one opened. It is obvious that whatever disengaged air lodges in the vertex of the syphon, will immediately pass into the lower cylinder and rise to the top of it, as shewn in Fig. 1., displacing an equal bulk of the contained water, which of course will descend into the syphon, and be carried off by the current. When it is apprehended that a considerable portion of air has accumulated in the lower cylinder, the lower stop-cock A is to be shut, and the upper one B opened. The air will now immediately rise into the upper cylinder, from which an equal bulk of water will descend and occupy its place in the lower cylinder, which will thus be again filled with water as at first. The upper stop-cock B is then to be shut, and the lower one A opened for the admission of the accumulating air as before.

The two cylinders being supposed equal and similar, the *rate* of the accumulation of air will be ascertained by simple inspection. Suppose, for instance, that after the syphon has been four hours at work, it should be found, on the first

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working of the stop-cocks, that the depth of water in the upper cylinder has diminished from 12 to 8 inches, that is, that 4 inches of water have descended from it into the lower cylinder, it will be apparent that the disengaged air is accumulating at the rate of one inch per hour, and, consequently, that it will be necessary to work the stop-cocks at least once in 12 hours.

Suppose now, that cranks *a b* are fixed on the axes of the stop-cocks, so that, when worked simultaneously, the one shall always be shut when the other is opened (the axes of the cocks being lengthened 2 inches, so as the cranks may work clear of the line of the sides of the cylinders), and that the two cranks are connected by a vertical rod *m n*, with a small cross-bar F in the middle of it, for the convenience of the hand; it is now plain, that, if the person attending on the syphon lays hold of the cross-bar F, and presses it downwards, he will, by means of the cranks and connecting rod, open the upper stop-cock, and, by the same movement, shut the lower one. As soon as the air has ascended, he will, by drawing up the handle, reverse the cocks, shutting the upper and opening the lower one; and, having observed what quantity of water has descended from the upper cylinder, by dipping his foot-rule into it, he will fill it up, if necessary, with water, to be in readiness when required.

To avoid complexity, I have hitherto supposed the valves equal in size; and if they be worked by the *hand* separately, or even simultaneously, there is no objection to their being so. But it must not be forgotten, that the current of the syphon creates a great suction from below; or, to speak more accurately, that there is a great difference between the atmospherical pressure *above* and *below* the valves; which last, in a long limbed-syphon, approximates more or less to a vacuum, the air in the cylinder C being consequently in a state of rarefaction. It is also to be remembered, that the air disengaged from the syphon ascends quietly, and without resistance,

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through the valve A; while, in passing through the valve B, it has to ascend against the resistance of the current of water descending from the cylinder D, with a velocity as much greater than what is due to its natural gravity, as the density of the external air exceeds that of the air enclosed in the cylinder C. It is, therefore, proper, especially if the valves be worked simultaneously, and with a *slow* motion, by machinery, that the orifice of the valve B be larger than that of the valve A, so that the water, during the motion of the valves, may descend with at least as much velocity through the former as through the latter; and no great nicety is necessary in adjusting the proportion, for no inconvenience can accrue, though it should run *faster through B* than through A. Therefore, suppose the diameter of the valve A to be $\frac{3}{4}$ inch, if that of B be made $1\frac{1}{2}$ inch, then (the areas of circles being as the squares of their diameters) the latter would, if there were no air to ascend, discharge the water 4 times faster than the valve A; which is a sufficient difference to allow for the free ascent of the air.

The mechanism required for the construction of the draining syphon, agreeably to the principle above developed, is so extremely simple, that I should scarcely judge farther explanation necessary, to enable any practical mechanic to construct and put it in operation. The chief thing that occurs to me as proper to mention in addition is, that, to ensure the steady and smooth working of the cranks, their necks should be made to work through sockets, in an upright bar of iron (as *n n n*, Fig. 4.), the upper end of which may be rivetted or soldered to the side of the upper cylinder, and the lower end bolted into the frame-work.

In situations which admit of a run of water being conducted to the upper cylinder in a one-inch pipe, it would be found convenient to make use of it for the occasional filling up of the cylinders by means of a lever-nose-cock; and, by connecting the lever of the nose-cock with the working-rod of the

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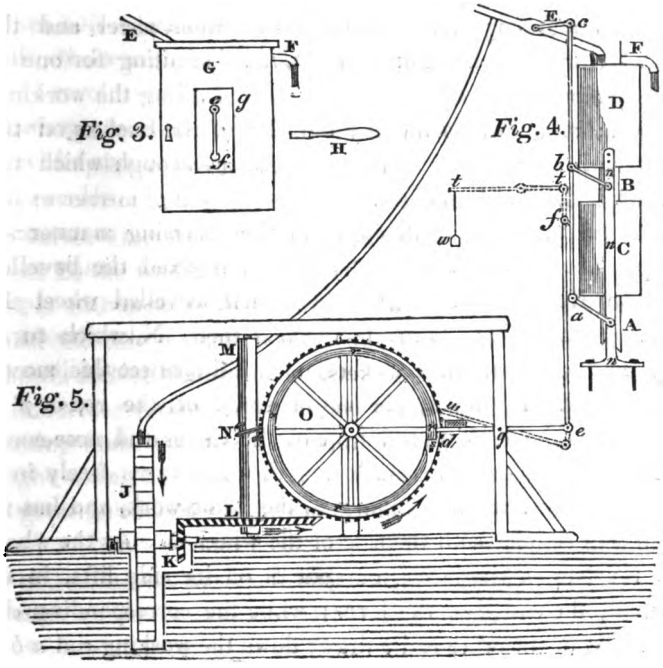
valves (as in Fig. 4. of the annexed sketch), the same movement which opens the valve B to permit the ascent of the air, and the descent of an equal bulk of water, would open the nose-cock E, and at once replace the water which had descended. In that case, a waste-pipe F may be added to carry off any superfluous water, should the discharge of the nose-cock not exactly correspond with that of the valves A and B.

It might be proper, for the security of the machinery, to enclose the whole in a wood case or box (G, Fig. 3.); and a plate of iron *g* being placed in the side of it, containing a longitudinal opening or slit *e f* opposite to the handle or pike of the working-rod, the valves may be worked by means of a key H, the barrel or bore of which, when inserted through the slit, fits upon the pike, and moves it up or down in the manner in which a pass-key lifts a door-latch.



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Should the simple mechanism I have described for improving the syphon be found useful in practice, it is possible it may sometimes be desirable that means were devised to work the valves regularly, without the necessity of attendance. I think this is quite practicable, wherever a run of water can be obtained sufficient for turning a small wheel of 3 or 4 feet diameter, such as is sometimes used for turning a kitchen-jack; and a branch from the pipe, which fills the cylinders, would probably be adequate to the power required.

I have represented in the annexed sketch, Fig. 5., a simple combination of wheels and levers, by which I conceive the object now in view might be accomplished. Since the valves only require to be worked at considerable intervals of time, the object to be aimed at is to produce a revolution sufficiently *slow* for that purpose. There are several obvious means of doing this; 1st, By the intervention of a due combination of pinions and cog-wheels between the water-wheel and the valves, or, what I think preferable, substituting for one of the pinions an *endless screw*; 2d, By loading the working-wheel; and, 3d, by limiting the size of the buckets on the water-wheel, and contracting the orifice through which the water is delivered on them.

These means I would apply in the following manner:—Upon the axis of the water-wheel J, is fixed the bevelled pinion K, which turns the horizontal bevelled wheel L, having on its axis L M, the endless screw N, which turns by its revolution the cog-wheel O. To connect this movement with the valves, the upper end *f* of the rod *e f* is jointed to the working rod *a b c* of the valves and nose-cock, and its lower end *e* to the lever *e d*, which turns freely in a vertical direction on its axis *g* in the frame-work, and has its end *d* in contact with the side of the wheel O. As the wheel O revolves, a single cog or spur S on its side lifts, in its ascent, the end *d* of the lever; while the corresponding depression of the other end *e* draws down the working-rod *a b c*,

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shutting the valve A, and opening the valve B, and the nose-cock E. As soon as the revolution of the wheel O has carried the cog 3 past the lever, the latter is brought back to its place by the counter-weight W, adjusted by observation to the resistance it has to overcome, and the rising of its end *e* pushes up the rods *e f* and *a b c*, and restores the valves to their original position*.

The sketch is not drawn to a scale, and it is impossible, without actual experiment, to determine accurately the absolute size of the machinery. But the power necessary to move three valves cannot be considerable; and I suppose the water-wheel J to be 4 feet in diameter; the pinion K, 6 inches, with 10 teeth; the wheel L, 3 feet, with 60 teeth; and the wheel O, 3½ feet, with 100 teeth. Then, since one complete revolution of the screw N moves one tooth of the wheel O, it is plain that, during one revolution of the latter, the wheel L makes 100 revolutions; and that, from the proportion of the teeth, the water-wheel and its pinion K makes 6 turns for every revolution of the wheel L, and, consequently, 600 turns for every revolution of the wheel O. Therefore, if the water-wheel be supposed to make 5 turns per minute, the wheel O will revolve once in every ($\frac{600}{5}$ =) 120 minutes, and will move the valves every two hours. If 90 teeth be allotted to the wheel L, the working wheel will revolve once every 8 hours; and, if 100 teeth were given to the wheel L, and 200 to the wheel O, the periodical revolution of the latter would be 6 hours and 40 minutes.

A farther retardation of the motion may be effected, by planting upon the wheel O a friction-wheel, to be acted on by a light spring fixed to the frame-work. And if a spiral form be given to this friction-wheel, as represented in the sketch

* The direction in which the wheels revolve is indicated by the arrows attached.

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r r r *, another advantage will be gained; for it may be so adjusted, that the wheel shall be released from the pressure of the spring during the time that it is performing its work; and thus an addition will be made both to its force and velocity, while it is doing the office of moving the valves.

In situations where no constant run of water can be obtained for filling the cylinders and turning the water-wheel, the small quantity necessary for the former purpose might, in all cases, be obtained by collecting rain or surface-water in a tank or cistern on the level of the upper cylinder, with a pipe leading from it to the nose-cock E; and a portion of the water discharged from the syphon might be employed to move the water wheel J. Only, as in that case, it must necessarily be placed at a considerable horizontal distance from the valves, it will then be requisite to connect the lever *e d* with the valves by a set of two or more cranks and rods or wires; in which case an additional lever and counter-weight, as *t t*, Fig. 4, must be applied to the valve-rod, to bring back the cranks to their position of rest.

Feb. 1. 1830. J. S. H.

P. S.—This paper, consisting of two essays, written at different times, having gone to press without my having had an opportunity of revising it, appears in rather an imperfect form. I wish, therefore, to be allowed to add in this place, that, perhaps in practice, *valves* would be advantageously substituted for the *stopcocks* represented in the figure. This variation would be attended with one considerable advantage—that the pipe connecting the two cylinders might then be dispensed with

* It is here represented as on the same side of the wheel with the lifting-cog; but it may be more properly applied to the opposite side.

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(see Fig. 6.); and as the bottom of the upper, and top of the lower, cylinder would then coincide, the passage of the air into the upper one would be greatly more free and unobstructed. I

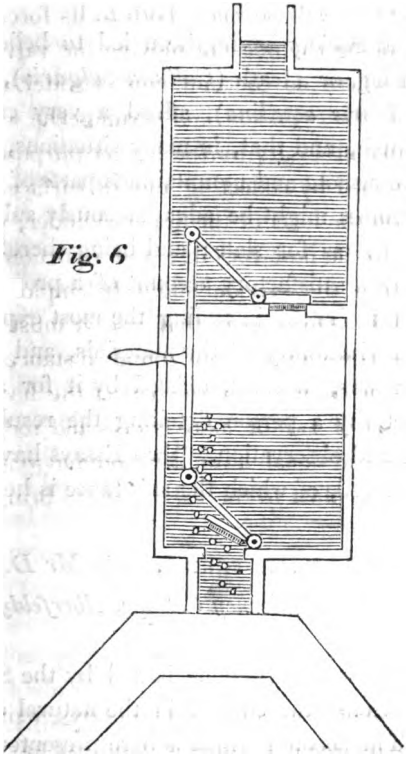

Fig. 6

wish also to observe, that I think the air-vessels now proposed to be applied to the *draining syphon* would be equally applicable to the improvement and more extended use, in particular situations, of a syphon of another description—I mean pipes for conducting water, where an impracticable ridge of elevated ground occurs below the fountain-head; and that, in this way, the command may be obtained of many springs which are now deemed inaccessible in consequence of the troublesome and imperfect manner in which water-pipes are at present freed of air by the use of force-pumps and air-cocks.

March 20. 1830. J. S. H.

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ESSAYS ON THATCHING WITH HEATH AND FERN.

[THE Highland Society having been led to believe that the Common Ling or Heath (*Calluna vulgaris*), and Brake or Fern (*Pteris aquilina*), afford a very effectual and durable thatch, and that, in many situations, particularly in the more remote and mountainous parts of the country, these substances might be advantageously substituted for straw, as well as for slate; and being therefore desirous of obtaining a satisfactory account of a proper method of using them as thatch, including the most expedient slope of roof, the durability of the materials, and the expense, a premium was, in 1829, offered by it for an Essay on this subject, by a person detailing the results of actual experience and observation. Two Essays have accordingly been received, of which the substance is here given.]

I.—ON THATCHING WITH FERN *. *By Mr DAVID CAMPBELL, Camuserney Cottage, Aberfeldy.*

AGREEABLY to the instructions issued by the Society, it is proposed to discuss the subject in the natural order of the operations. The account which is here presented, will therefore be reduced to four heads: 1*st*, The best season for procuring the materials; 2*dly*, The best method of applying them; 3*dly*, Their duration; 4*thly*, The expense of the operation. The fern is ripe, and consequently in the best condition for thatching with, from the middle of September to the beginning of October; and its ripeness may always be known by its colour then becoming a mixture of yellow and red, the latter

* Mr. Campbell has also transmitted some very satisfactory observations on thatching with heath; but it has not been deemed necessary to give these, as the same subject is more fully treated of in the other essay.

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colour predominating more and more as the fern proceeds towards a withered or decayed state. It should therefore be always pulled as soon after it becomes ripe as possible, more especially as frost destroys it, by causing its stalk to rend, which unfits it for being advantageously used as thatch. The best method of pulling the fern, is to take hold of the stalk with one hand immediately below the branches, and with the other hand within a few inches of the ground, the branches being laid in under the arm of the hand nearest them. It should be held pretty firm, otherwise, if allowed to slip through the hands, it cuts them like an edged tool. A smart tug generally disengages the roots, and the person employed goes on pulling one by one, in this manner, till he has a handful, which he lays down beside him. About a dozen and a half of handfuls are laid together in bunches. When not immediately carried home, these bunches are put up in heaps, where they remain till used; and it is always advantageous for them to lie so for a few days. The operation of pulling the fern should always be performed in dry weather, as the stalks then come cleanly out of the ground. If pulled in wet weather, some earth always sticks to the roots, out of which tufts of grass and weeds grow in the course of next summer, which invariably take in water, as that part of the fern, which is under the grass or weeds, and which acts as the conductor of the rain, decays, and the rain then makes its way through the roof. But not only should the fern be pulled in dry weather, but it should also be applied in a dry state, for on this being the case depends entirely, I may say, its durability as thatch. The most durable, as well as the most manageable kind of fern, is that which grows in pretty good land, and to the height of from three to four feet. When it grows much higher and thickly together, as in deep, rich banks, it is not so firm or serviceable; and where, again, it is stunted, as in hard gravelly soils, it is difficult to pull it, and it cannot from its shortness be used as thatch.

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The next part of the operation is to apply the fern thus obtained as thatch; and for this purpose, it should, when carried home, be laid down quite close to the building to be thatched. The implements required, are two ladders and a thatching-beam. The ladders must of course be sufficiently long to extend a few feet beyond the ridge of the building, and the length of the beam should depend partly on the kind of timber of which it is made, and partly on the length of the buildings to be thatched. For houses averaging 40 and 60 feet, the most useful length of beam would be about 20 feet. It may, however, be shorter; but if much longer, it requires to be so gross as to make it quite unwieldy, otherwise it will bend so much with the weight of one or two men placed near its centre, as to throw a curve in the different plaits or courses of the thatch, which, if not positively injurious, is at least very unsightly. A beam 20 feet long, may be from 5 to 6 inches broad, and from 3 to 4 inches thick, according to the quality of the timber. A rope, or an iron chain (the latter is the best), with a hook at the end of it, is attached to each end of the beam by which it is fastened to the ladders, which are placed against the roof, parallel and quite close to it, and standing the length of the beam from each other. Before beginning to lay on the thatch, it is necessary to pull out all the tufts of grass and weeds that may have grown on the roof, and then sweep it with the branch of a birch tree. Having placed the ladders against the roof in the manner above described, the thatcher proceeds to work by laying a quantity of cut ferns to the depth of 5 or 6 inches, on the face that covers the side-walls, and fixes them there firmly, by introducing their points under the turfs. These cut ferns are intended to answer the same purpose as the first course of slating, and may with equal propriety be called the "easing." This easing should, in the first instance, be left pretty full, as it can afterwards be cut to the proper length; but if made

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thin or bare at first, it cannot be properly remedied again. On this easing the thatching-beam is gently laid, being fastened at each end to the ladders. The thatcher then provides himself with a quantity of the fern, which he lays down on the roof beside him; and sitting on the roof, and supporting himself there by placing his heels on the beam, he takes a handful of the fern, about half a dozen stalks, and sorts them, by lopping off any branches that grow too far down the stalk, adjusting the points so as to be of the same length; and then bending them over, almost to breaking, where the branches commence, to make them lie the closer, he lays them on the roof quite straight, with their points resting on the thatching-beam. The thatcher then takes up another handful of fern, which he sorts and lays on the roof in the same way as the first handful; and proceeds in this manner till he comes to the end of the beam. He then takes up the beam at that end by means of the chain fixed to it, from 6 to 8 inches, according to the distance he intends to have between each layer or course of the fern, and having fastened it, he goes down the ladder on which he is then standing, and taking up a quantity of fern over his shoulder, proceeds up the other ladder, adjusts the beam to the same height as at the other end, and then proceeds to lay a second course in the same way he did the first; and so on, until he arrives at the top or ridge of the house, which is generally secured by long turfs taken from tough ground.

With respect to the most expedient slope or pitch of the roof, there can be no doubt that the steeper the roof the less is the chance of its drawing water; but then, in the event of the house being of any breadth, say 15 feet, and the side-walls from 6 to 7 feet high, to procure a great slope would throw the roof so very high as to make it disproportionate to the side-walls, and would moreover increase the difficulty of securing the thatch against the wind. I have therefore always preferred a slope or pitch of roof from 4 to 8 inches below the square; and although such a slope may be considered

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as rather little in the first thatching, it will be kept in view that every additional coating has a tendency to increase it, so that, by the time a house gets a third covering, the slope which was originally 6 inches below the square, comes to the square itself.

It was said that the distance between each layer or course of the fern is generally from 6 to 8 inches. This distance should be regulated entirely by the length of the fern. When it averages from 3 to 4 feet, 6 inches are the best distance; but, when it is longer, the distance may vary from 7 to 8 inches. But it should not exceed this distance, as the thatch would then have what slaters call too little covering, and would not remain water-tight any length of time.

The next object of consideration is to secure the thatch from being blown off by the wind—a matter of greater importance than would appear to be attached to it, from the number of accidents of this kind that occur. The degree of precaution to be adopted, with this view, must depend in a great measure on the situation of the building; for, if exposed to strong gusts, or eddying winds, hardly any precaution can guard against their violence; but, if well sheltered, or even if situated in an open district, less security is required. In the former case, the best thing for securing thatch is ropes made of heath, or pliant birch-twigs, laid on the roof at right angles; that is to say, one set of the ropes running from side to side over the roof, and fastened by wooden pins put into the turf covering the side-walls, and the other set running horizontally along the roof, and fastened into the turf on the gables. Where these ropes are not to be had conveniently, light spars made of common fir may be substituted in their place. Where, again, less security is required, the same substances may be used, only in much smaller quantity. Care should always be taken, where pins are driven into the thatch, that they be made to slant *upwards*.

Thatch laid on and secured in the manner above described, if done properly, and by an experienced hand, will last on the

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south or sunny side of a house for eighteen or twenty years (in some instances it has been known to endure for thirty years); while, on the north side, its duration cannot be calculated on much beyond eight or ten years. If the house, however, were built north and south, as barns generally are, the duration of the thatch on *both sides* might be reckoned on for the first mentioned period, *i. e.* eighteen or twenty years. The reason of this difference of duration between the south and north side is, that while heat and dryness contribute to the preservation of the fern, wet and damp hasten its decay.

It only remains now to give an idea of the expense of this kind of thatch. The following rates may be taken as an *average* applicable to most districts. For the sake of perspicuity, I shall apply the calculations to a house 40 feet long, and the height of the roof 18 feet on each side, which will give a surface of 115½ square yards, or 3 roods 7⅝ ells, to be thatched. If the fern be abundant, and easily taken out of the ground, an active man will pull about a cart-load of it in a day, for which he would require 1s. 6d. of wages. This cart-load, it is considered, would thatch about 6½ square yards, so that it would take 18 cart-loads to thatch the given space, thus making the expense of pulling the fern

about	L. 1	7	0
A good hand will thatch about 7 square yards in a day, so that it would take nearly 17 days to thatch the house in question, and which, at 1s. 6d. per day, would come to . . .	1	5	6
The expense of carrying home the fern cannot be estimated under 6d. per cart, if near at hand, nor under 1s. if at a distance, average 9d. per cart, ...	0	13	6
Expense of turf for rigging, and of securing the thatch, say	0	9	0
In all, .	L. 3	15	0

Or something more than 7¾d. per square yard.

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The expense or value of the fern itself has not been included in the preceding calculation, because, in most cases, where it at all prevails, tenants have it growing on their own premises; but, as I have seen it sold at every price, from 1s. to 5s. per cart-load, I shall here value it at 2s. 6d., which, for 18 loads, is L. 2, 5s.; so that, including every possible expense, the total amount would not much exceed 1s. per square yard.

II.—On Thatching with Heath. *By Mr John Collier, Thatcher, Cotburn, near Turiff.*

Thatching with heath is at present more generally practised in Aberdeenshire than it has been for many years; the cause of which may be ascribed to the gradual improvement which has taken place in the manner of using it. In order to insure durability and comfort, there are three things which must be carefully attended to, viz. the *pitch of the roof*, the *quality of the materials*, and the *manner of thatching*, or of laying them on.

By the *pitch of the roof* is meant that degree of slope which is necessary for carrying off rain water. This, as is well known, must always vary in proportion to the width of the house. Houses intended to be thatched with heath are generally built from 12 to 16 feet wide (within walls), and the pitch, which, upon various trials, has been found to answer best for these, and the intermediate widths, is as follows:

Under 12 feet wide, roofed square.					
Houses from 12 to 13 feet wide, 6 inches above the square.					
Ditto	13 to 14	ditto	8	ditto	
Ditto	14 to 15	ditto	10	ditto	ditto
Ditto	15 to 16	ditto	12	ditto	ditto

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The above scale is constructed upon the supposition that thin turf, or divot, is to be used under the heath. If, however, it is considered preferable to lay the heath *immediately* upon the lathing, as is sometimes done, it will be necessary to elevate the pitch of the roof four inches. It is a common practice to put three or four rows of slates along the eaves; this plan renders a lower pitch of roof necessary, because the workman has it in his power to commence laying the heath thinner upon the upper row of the slates than he could do by beginning upon the top of the wall, and thus, by increasing a little in thickness towards the top, to lessen the slope in the same proportion. Six inches upon the height of these roofs may be safely deducted. This method of roofing has a very handsome appearance, and is found to answer extremely well.

It is common also to use tiles under the heath, in place of thin turf. In this case, likewise, a lower pitch of roof is necessary, because the heath not being altogether depended upon, a smaller quantity will suffice; consequently the stalks are laid on with more obliquity, and carry off the rain better. But it may be asked, Why is it necessary to cover tiles at all —will they not form a sufficient roof without any thing else? The answer is obvious. In situations far removed from the sea-coast, they cannot be made to stand the winter. Owing to their great porosity, they generally absorb about one-seventh part of their weight of water. This water, when converted into ice, expands to such a degree as to shiver the tiles in a very short time; hence it becomes necessary to defend them, by covering them with heath or straw. When this plan is intended, however, the tiles do not require to be pointed with lime; on the contrary, it would be much against the roof to do so, as it would prevent the admission of air, without which neither heath nor straw will have long duration.

When durability is intended, the quality of the heath is of paramount importance. Heath which grows in a damp,

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mossy soil, or in young plantations where it has the benefit of shelter, will answer; but that is always considered preferable, being a hardier and more durable plant, which is found in an open exposed situation, provided it be not the strong forked kind, which is so often to be met with where the crop is not sufficiently thick. The best heath for thatching is found growing in close beds, with a slender feeble stem, to the height of 18 inches or 2 feet, so weak and slender as to be unable to support its own weight without leaning,—and this kind is the most durable that can be obtained.

Heath generally begins to vegetate about the month of June, and continues to do so till the middle of August. During that period it may be said to be in its weakest state, being too soft and spongy for use. It can, however, be made sufficient for thatching, by exposing it to the drought for three or four days after it is pulled. It may be remarked here, that heath which is intended for thatch ought to be pulled up by the root, instead of being cut; pulling being the more expeditious plan, and not so liable to injure the quality of the heath. After being pulled, it may be bound up in sheaves, and laid in rows, straight and regular, that it may not be pressed into any crooked form.

Heath, like straw, or any other thatch, requires something to render it compact, and also to make it adhere to the roof. For this purpose, rope-yarn is sometimes used, and, where it can be done with safety, it must be allowed to possess decided advantages. The heath being laid immediately upon the lathing, renders any intermediate covering, such as tiles or turf, unnecessary. Of course, *lightness* may be said to constitute one of the principal qualifications in roofs of this description. It is objected, on the other hand, that rope-yarn is very apt to be cut by vermin, and this circumstance alone prevents it from being generally adopted. In open sheds, where vermin are not so apt to lodge, and where greater security is necessary to prevent the roof from being injured

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by high winds, it is generally preferred; but good clay is reckoned superior, in point of utility, for all ordinary purposes, being ductile and adhesive, and perfectly free from any injurious tendency.

The most approved mode of laying on the heath which has come under my observation, is the following. In thatching with straw, the common plan is to carry up the respective layers perpendicularly; the workman marks off a certain distance, and, beginning at the eave, proceeds to the top before marking off more. In thatching with heath, however, there is this difference, that the layers, instead of being perpendicular, are horizontal, running from one end of the roof to the other. The workman commences by placing a ladder under the eave, two feet or so from the right-hand gable; then, placing heath before him on the ladder, he takes from it as much as he can conveniently hold in one hand, and, clearing it of moss, and laying the tops even, he reaches to his left, as far as he can with ease, and lays it upon the top of the wall, making it project a hand-breadth. The second handful is disposed of, in the same manner, alongside of the first; and so on, till the layer be completed at the right-hand gable. The second layer is done in the same manner, but with this difference, that it ought to project a little over the first; and these two constitute the eave of the roof. All the subsequent layers must be laid on with such a slope as will be sufficient to correspond with the slope of the roof; every separate handful being properly adjusted before it be laid down Five of these layers can be conveniently put on before shifting the ladder, which is supposed to be still under the eave; but it ought to have been mentioned, that the first, second, third, and fifth layers require to be respectively bedded with clay, in a sufficient quantity to make them adhere to each other: the eave being more exposed, and consequently more apt to be injured than any other part of the roof. The clay may be afterwards used more sparingly; a little of it under

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every third layer being all that is necessary. Having finished the first layer in the above manner, the ladder may be removed four feet to the left hand, and precisely the same plan of operation observed with the second, taking care always to join the two together, each layer to its corresponding one, so that their union may be complete. After proceeding in this manner the whole length of the roof, the ladder is elevated above the eave, and the workman goes on in much the same way as formerly, marking off his sets, the same as upon the eave. In order to carry off the rain more readily, it is necessary to give the roof, or rather the rib, a little swell towards the middle. For this purpose, the shortest heath ought to be used above the eave, and the longest about half-way up; and where heath cannot be got sufficiently long to give the rib the necessary degree of curve, it must be made up at the back. Throughout the whole process, it must also be observed, that, in order to carry off the rain, every separate handful of heath ought to be elevated a little at the inner end; or, in other words, to be laid on at an angle of 25° or 30°. After both sides of the roof are finished in the foregoing manner, the top may be formed of clay, carefully mixed with cut straw. The whole surface of the work ought then to be gone over with a pair of scissors, cutting off only, however, the loose detached fibres; and the eaves may be cut with a large knife, which is held by the workman in a direction almost horizontal.

It remains only now to make a few remarks on the durability of heath thatching; and to state the ordinary expense at which it can be done. When the above method is strictly followed, the durability may be stated at from 20 to 30 years. In some instances it may be less; but, where this is the case, it is generally owing either to a disadvantageous local situation, or to some other accidental circumstances. Damp situations are, in general, less favourable to its duration than more elevated and airy ones.

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The ordinary expense may be estimated at L. 1, 14s. per rood. One rood requires 24 threaves of heath, and 2 cart loads of clay. The heath can be pulled for 7s., and laid on for L. 1, 3s., per rood, including a labourer's wages, 5s. The materials may be brought one mile for 4s.; making in all the sum of L. 1, 14s.

[The Highland Society having, in 1829, directed the attention of the public to the effects of Nitre or Saltpetre as a manure or top-dressing to land under crop, by offering its Gold Medal for the best Essay or Report founded on actual experiment on that subject, the following communication has been received.]

REPORT ON THE EFFECTS OF NITRE AS A MANURE. *In a Letter to Charles Gordon, Esq. Depute Secretary to the Highland Society. By* ROBERT BRUCE, *Esq. of Kennet.*

DEAR SIR,

As the Society has offered a premium for a report, from experiment, on saltpetre used as manure, I take the liberty (without intending to compete) of addressing a letter to you, in the hope that a short account of experiments made at Kennet last year may be useful to those intending to apply nitre or saltpetre as a manure on a larger scale.

I procured from London last spring 12 cwt.; the price L. 1, 7s. per cwt.; freight, commission, &c. 1s. more. I applied it on wheat, grass, and oats, at the rate of 1¼ cwt. per Scotch acre, accurately measured, and the saltpetre weighed out. The only variation of the experiment was in the time of applying it, and in sowing when the land was wet or dry. On grass, the effect produced was very extraordinary. I se-

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lected two portions of a field of strong clay, sown out with pasture grasses, and the saltpetre was applied on the 28th of March 1829. In about eight or ten days after, the ridges which were sown with it were quite different from the others. The colour was a darker green; the plants of grass began to shoot out, and vegetation commenced before the remainder of the field. In fourteen days there was no occasion for pins to mark the places where it was applied, and there was a full bite before the rest of the field could be pastured. The grass was also sweet and luxuriant, for the cattle appeared to prefer the saltpetred ridges, and kept them bare of grass.

I also applied it on two fields of hay: one of coarse land, the other a dry field. The difference was the same in both; the ridges could be pointed out two fields off, and grass for the work-horses was cut sixteen days before the remainder was ready. There was also more bulk of hay.

The wheat to which it was applied was after summer-fallow with lime, but without dung of any kind. I selected four different portions of a field of strong clay. Two portions had saltpetre on the 28th of March, the other two on the 14th of April, when the land was very wet, and the difference was very apparent in about four weeks afterwards, the colour being then darker, and the blade broader. When in ear, the straw was about five or six inches taller, and when reaped, there was more bulk; but the whole field, before the wheat was quite ripe, became so lodged and beat down with the heavy rain in the autumn, and the crop was in consequence so injured, that I can give no information as to the quantity or quality of the grain.

To oats I applied it on two ridges, but gave them rather more than $1\frac{1}{4}$ cwt. to the acre, as the field was situated on the side of a turnpike road, that the experiment might be better seen. The stalk, while green, was also much darker in the colour, and stronger, so much so as to become lodged, by which the crop was entirely lost. None of the remainder of

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the field was lodged. I should think on white crops, less than 1¼ cwt. may be used with advantage, which would make the expense very moderate. It ought to be applied when the land is moist, for I observed with respect to the wheat to which it was applied on the 14th of April, after rain, that the vegetation was sooner apparent than on the portion of the same field to which it had been applied on the 28th of March, when the land was dry.

I also ascertained, by some small experiments in the garden, that a very large quantity of saltpetre does not destroy vegetation, but promotes it. A neighbour of mine also applied it to a crop of carrots in a field with good effect.

TORQUAY, 20*th January* 1830.

REPORTS ON LAYING DOWN LAND TO PERMANENT PASTURE.

[The indigenous plants of a country being those which might naturally be expected to succeed best in the formation of artificial pastures, the Highland Society, in 1827, offered a premium, for the most successful experiment in laying down to permanent pasture a field not less than five statute acres. No limitation was made as to the species to be tried, although the grasses generally acknowledged as the most valuable were more particularly recommended. The more immediate object of the Society, in offering this premium, was to obtain decisive experiments as to the different kinds best adapted to a variety of soils, and to the climate of the country. The premium has been continued; but the ground to be laid down to pasture has been extended to ten acres. In the mean time, the Society has ordered the following Reports to be printed.]

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I.—REPORT RELATIVE TO THE LAYING DOWN TO PERMANENT PASTURE A FIELD OF MOORISH LAND. *By ADAM FERGUSSON, Esq. of Woodhill.*

THE attention which has of late years been directed, by the Highland Society, to the formation and improvement of pastures, cannot fail to be productive of much benefit. The cultivation of our indigenous grasses, and a judicious selection of those best suited to different modifications of soil and climate, will secure to the farmer in one season, the results which it has hitherto taken a tedious course of years to attain, while the quality of his pasture will be decidedly superior to what the old mode of proceeding, by clover and ryegrass, could possibly produce.

The details now submitted, in reference to the premium offered for laying down land to permanent pasture, relate to a piece of moorish ground, which, in 1827, the proprietor resolved to treat in this manner. In its natural state, besides the heath, *Calluna vulgaris*, the produce seemed chiefly composed of the following plants:—Woolly soft-grass, *Holcus lanatus*; timothy-grass, *Phleum pratense*; turfy hair-grass, *Aira cæspitosa*; sneezewort, *Achillea Ptarmica*; upright mat-grass, *Nardus stricta*; yellow bedstraw, *Galium verum*; a species of *Agrostis*; tormentil, *Tormentilla officinalis*; and a species of *Carex*. The whole had been spade-trenched, and the stones laid upon the surface, ready for walls and drains, at an expense of L. 5, 10s. per Scotch acre.

The field at present referred to contains pretty nearly seven imperial acres, and has been laid down to pasture in the following manner:—In the autumn of 1827, it was ploughed, harrowed, and made tolerably smooth; and in April 1828, was dressed with bruised bones, spread broad-cast, and covered by a shallow furrow, at the rate of thirty bushels to each Scotch acre. The following grass seeds, procured from Mr

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Lawson, seedsman to the Society, were then sown, and lightly harrowed in, without any intervening crop. One portion of the field being somewhat damp, the quantities of certain grasses were varied accordingly, and one bushel of meadow foxtail-grass, *Alopecurus pratensis*, per acre, added to the portion which was moist.

For 3½ Scotch acres, dry:

Cock's-foot-grass,	3½ bushels.
Pacey's Ryegrass,	3½ ditto.
Mixed Fescues,	3½ ditto.
Crested Dog's-tail-grass,	14 lb.
Mixed Poas,	7 ditto.
White Clover,	18 ditto.
Timothy-grass,	7 ditto.
Suckling,	4 ditto.
Meadow Barley, *Hordeum pratense*,	½ bushel.
Yellow Oat-grass, *Avena flavescens*,	½ ditto.
Cow-grass,	2 lb.

For 2 Scotch acres, a little damp:

Cock's-foot,	1½ bushel.
Pacey's Ryegrass,	1½ ditto.
Mixed Fescues,	1½ ditto.
Crested Dog's-tail,	8 lb.
Mixed Poas,	7 lb.
White Clover,	10 ditto.
Timothy-grass,	7 ditto.
Suckling,	3 ditto.
Meadow Barley,	½ bushel.
Yellow Oat-grass,	½ ditto.
Meadow Fox-tail grass,	2 ditto.
Cow-grass,	5 lb.

The price of these seeds amounted to L. 13 : 18 : 6, or nearly L. 2 per imperial acre.

Little or no return was to be expected that season, from the crude condition of the soil; and the weather having proved peculiarly adverse to vegetation, there having been a

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long continuation of frosty drought, the field was dressed with lime in the following spring, 1829, at the rate of twenty bolls of shells per Scotch acre, and some additional grass seeds, chiefly Dutch, English, and Scotch hay-seeds, were sown. The object appears now to have been attained, the pasture having every appearance of doing well. It has not been deemed prudent to let it this season, nor to stock it very hard. The value, however, cannot be under twenty shillings per Scotch acre, whereas it never before exceeded twenty pence. Five horses, young and old, were grazed upon it during last season, in the highest condition, and these having been removed in autumn, a fresh flush of grass immediately sprung up, affording an excellent bite to any description of stock. Three adjoining fields are now in progress of laying down to pasture, under varied modes of culture.

II.—REPORT RELATIVE TO THE LAYING DOWN TO PERMANENT PASTURE PART OF THE LAWN OF MORMOND HOUSE, IN THE COUNTY OF ABERDEEN. *By* JOHN GORDON, *Esq. of Cairnbulg.*

THE extent of the land laid down to permanent pasture was twenty imperial acres. The soil is a good light loam. In 1811 it was partly fallowed, and partly in turnips, thoroughly cleaned and manured, and in 1812 was sown with oats and the following grass seeds, procured from London:

White Clover, *Trifolium repens,*	96 lbs.
Cow-grass,	96 ditto.
Trefoil,	96 ditto.
Rib-grass, *Plantago lanceolata,*	40 ditto.
Meadow Fescue, *Festuca pratensis,*	56 pecks.
Meadow Foxtail, *Alopecurus pratensis,*	56 ditto.
Dog's-tail Grass, *Cynosurus cristatus,*	32 ditto.
Pacey's Perennial Ryegrass,	20 ditto.

In 1813 it was cut for hay, and produced a fair crop. Ever since that period it has been regularly pastured, and is

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considered one of the best pastures in the part of the country in which it is situated.

It is proper, however, to observe, that the above twenty acres form only a portion of the lawn, part of which was laid down previous to 1812, and part a year or two after, but with the ordinary grasses. On comparing these portions with that laid down with the above mentioned grasses, no obvious difference is observable, only perhaps the latter has a somewhat finer texture.

III.—COMMUNICATION RELATIVE TO THE LAYING DOWN TWENTY-TWO ACRES OF LAND TO PERMANENT PASTURE.

By ROBERT ABERCROMBY, *Esq. of Netherlaw.*

In the end of April 1828, twenty-two imperial acres of stiff clayey soil were sown with the following grasses:—

Cock's-foot grass,	*Dactylis glomerata,*	66 pecks.
Meadow Fescue,	*Festuca pratensis,*	22
Oat-like soft-grass,	*Holcus avenaceus,*	10
Ryegrass,	*Lolium perenne,*	67
Rough Meadow-grass,	*Poa trivialis,*	1
Dog's-tail Grass,	*Cynosurus cristatus,*	5½
Meadow Cat's-tail,	*Phleum pratense,*	11
Red Clover,	*Trifolium pratense,*	5½
White Clover,	*Trifolium repens,*	2½
Black Medick,	*Medicago lupulina,*	5
Fiorin-grass,	*Agrostis stolonifera,*	3½
		199

The expense of the seed was L. 39, 10s., or about thirty-six shillings per acre. The field had been in green crop, partly turnip, and partly potatoes, and the grass seeds were sown partly with potato oats, and partly with barley. When the crop was cut, the young grass was so thick and strong, that to prevent its growing too rank, nineteen sheep were put on it the whole winter, until the end of March following. Besides these, five cows with their calves, four stirks, and two

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poneys and a foal, were kept on it during a great part of the autumn and winter. They were, however, taken off when the weather was bad, to avoid poaching the field, and the cows were housed at night. Although the spring was very dry, and hay in general a short crop, the produce averaged 276½ stones of sixteen pounds to the imperial acre. It was cut in the middle of June. The sole of grass is very thick and strong, and promises to answer the purpose of pasture well.

IV.—ACCOUNT OF THE METHOD PURSUED IN LAYING DOWN TO PERMANENT PASTURE SOME LOW-LYING SWAMPY LAND, IN THE PARISH OF JEDBURGH, ROXBURGHSHIRE. *By* WILLIAM BELL, *Esq. F. R. S. E.*

THE land in question is part of a low-lying hollow, comprising about 120 acres of flat surface, about 420 feet above the level of the sea. The valley of which it forms part receives the drainage of 2400 or 2500 acres. Sixty acres were pure moss, from 8 to 13 feet deep, surcharged with moisture, full of holes, and totally unproductive. Of the residue, a considerable part was swampy in the extreme, and a portion consisted of more elevated and drier land. The draining of this land cost about L. 650. From the peculiar circumstances of the land, it was judged expedient to lay down the whole to permanent pasture. It being resolved to proceed experimentally and slowly at first, several acres were laid off at the lower end, into squares of about an acre each, for the purpose of proving the various sorts of seeds and their mixtures. The whole was then pared with the flaughter-spade, and the turf gathered into heaps and burnt. The surface being then brought to a level, the ashes were scattered, and the grass-seeds sown. The grasses used were the ordinary mixture of all the clovers and ryegrass. One was kept purely of these seeds; to another was added cock's-foot, to another Yorkshire fog, and to another timothy-grass. They all succeeded where the ground had been left as originally pared, but for

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some time the holes which had been filled up, and those where the turf had been burnt, continued comparatively bare.

Mr Sinclair's *Hortus Gramineus Woburnensis* having been published at this time, the statements which it contained seemed so plain, that it was resolved to act upon his principle, in laying down the remainder of the land. The circumstances of the land having been represented to Mr Sinclair, the seeds recommended by him were the following: Meadow fox-tail, *Alopecurus pratensis;* meadow fescue, *Festuca pratensis;* hard fescue, *Festuca duriuscula;* roughish meadow-grass, *Poa trivialis;* crested dog's-tail-grass, *Cynosurus cristatus;* rough cock's-foot, *Dactylis glomerata;* Russel's perennial rye-grass, *Lolium perenne Russellianum;* timothy-grass, *Phleum pratense;* sweet-scented vernal grass, *Anthoxanthum odoratum;* smooth-stalked meadow-grass, *Poa pratensis;* fiorin-grass, *Agrostis stolonifera latifolia;* common purple-clover, *Trifolium pratense;* Dutch or white-clover, *Trifolium repens.* Mr Sinclair's list was considered the more satisfactory, that, with the exception of the timothy-grass, the land to be sown presented the same species along with several others.

The second portion of the land on which these seeds were sown, succeeded even better than the first. The third break was in all respects similar, and underwent a similar treatment, only that of the upper and lower parts of it about two acres, instead of being pared and burnt, were covered with moss from the drain, 4 inches deep. In these two acres, however, the herbage has turned out much coarser and less uniform than the rest. The fourth break being of deeper moss, was thrown into ridges 21 feet broad, the furrow being kept open as a ditch. It was treated by paring and burning, and is now in the course of being laid down with every prospect of success. The fifth break, of about eight acres, consists of pure black moss, and from the beginning very little was expected of it.

Each portion of the first three breaks has uniformly gone

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on improving since it was laid down. It has been hayed regularly every year, and pastured, before and after the hay was cut, with horses, sheep, and cows. Even in the first year, the crop was about 180 stones, of 22 lb., to the English acre, or about 325 stones to the Scotch acre. The crop of last year was 248 stones to the English acre, or about 320 stones to the Scotch acre; and the two preceding crops were of equal bulk.

	Acres.
There have thus been laid down in permanent meadow,	57
Of dry land also, so laid down, - - -	14
Of moist land along the bottom of old fields, -	18
There have also been drained, but not yet laid down:	
Of less valuable mossy ground, - - -	8
And of the same quality planted, - - -	3
While of old meadows, much improved by the draining, there are, - - - - -	18
	118

The produce of the 57 acres of meadow-land may be stated thus:

Pasture from 15th March to 23d May, 69 days, at 4d. per day, a two-year old ox, ...	L. 1	3	0
Pasture from August to 15th November, 107 days, at 3d. per day, ...	1	6	1
240 stones of hay, at 6d., . . .	6	0	0
	L. 8	9	1
Deduct cost of working the hay, .	0	6	0
Per English acre,	L. 8	3	1

In stating the expense, the cost of the main drain is not included:

Paring and burning, ...	L. 0	18	0
Levelling, and spreading the ashes, . . .	1	15	0
Sowing, and resowing, ...	1	5	0
Drainage, as applicable to the meadow, . .	3	12	0
Per acre,	L. 9	5	0

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DESCRIPTION OF A MACHINE FOR SOWING TURNIPS WITH BONE-MANURE. *By Mr* ALEXANDER NICOL, *Guildy, near Muirdrum.*

THE nature and construction of this machine will be understood from the drawing in Plate III. Fig. 1. It is intended for sowing two drills at one time. The manure is put into hoppers, from the latter of which there are spouts which descend more or less into the soil, according as it is desired to deposit the manure at a greater or less depth. The bottom of the hopper is closed on the one side by a ratchet-wheel, which turns with the motion of the machine, and every tooth strikes a catch or steel-spring fixed in the inside of the hopper, which agitates the bone-dust, and propels it regularly through an opening between the wheel and the other side of the hopper. This opening can be contracted or enlarged by a regulating plate, moveable up and down along the inclined plane on the other side of the hopper, and which being moved by a screw, can be set very accurately to any required quantity of dust to be deposited on an acre. Before the spouts is a large roller for rolling the drills previous to the deposition of the dust. Behind, there is a smaller one for replacing the earth over the dust, and then come the seed-boxes, and spouts for the turnip-seed, and a roller after them. The motion of the ratchet-wheel, within the hopper, is communicated by means of a pitch-wheel on the same axis, communicating by a pitch-chain with a similar wheel on the anterior roller.

A in the plate is the anterior roller. B B are the two hoppers. C C the end of the springs. D the pitch-wheel on the same axis with the ratchet-wheel on the hoppers, and working it by means of the pitch-chain connected with a wheel in the anterior roller. E, the mouth of the spout from the hopper. F, the roller behind the spouts. G, the turnip-seed box, with spout below. H, the posterior roller.

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DESCRIPTION OF A SUBSOIL PLOUGH. *By* JAMES SMITH, *Esq. of Deanston.*

THE Subsoil Plough, Plate III. Fig. 2. as designed and used by Mr Smith on the farm of Deanston, has been found peculiarly efficacious in rendering productive a sterile soil upon a tenacious bottom. It has been constructed so as to be of easy draught, and to penetrate to a depth of from 16 to 18 inches from the surface. It has no mould-board, and is intended merely to break and stir up the subsoil without bringing it to the surface, or mixing it in the first instance with the incumbent soil. It is, in fact, a *horse-pick*, and readily loosens and throws out all stones not exceeding 70 lb. weight. It is drawn by four horses, two and two abreast, and is held in the usual way by one man. In working, the common plough goes before it, taking a furrow 10 inches by 6 inches, the subsoil plough following in the bottom of that furrow, and going deeper by 10 or 12 inches. When this plough is applied on a tenacious bottom, and in conjunction with parallel drains about 2½ feet deep, and distant from 12 to 20 feet from each other, it produces wonderful effects in attaining a deep and dry soil; and even in gravelly and sandy bottoms, its effects are considerable, which is especially apparent in the succeeding pasture.

The cost of such a plough, with a soam-chain for the leading horses to draw by, is about L. 9. The ordinary swingletrees and harnessing suit, with straps over the quarters of the leading horses to bear up the swingletrees to their buttocks, and a chain from the collars of the hind horses to bear up the soam-chain.

This plough, with four horses, a ploughman, and a lad to drive, will do about an acre imperial per day, being at a cost of about L. 1, no charge being made for the common plough, as the land would require a furrow at any rate.

Such ploughs are made by Robert Robertson, smith at Drip (by Stirling), on the estate of Blair-Drummond.

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Fig. 1.

Machine for Sowing Turnips with Bone Manure

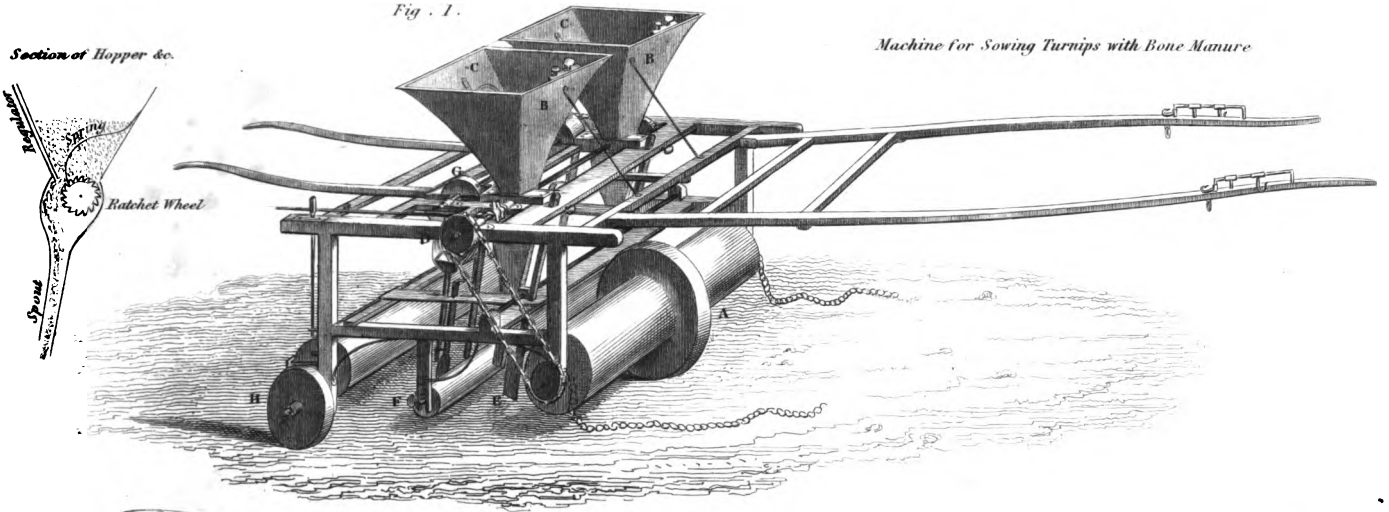
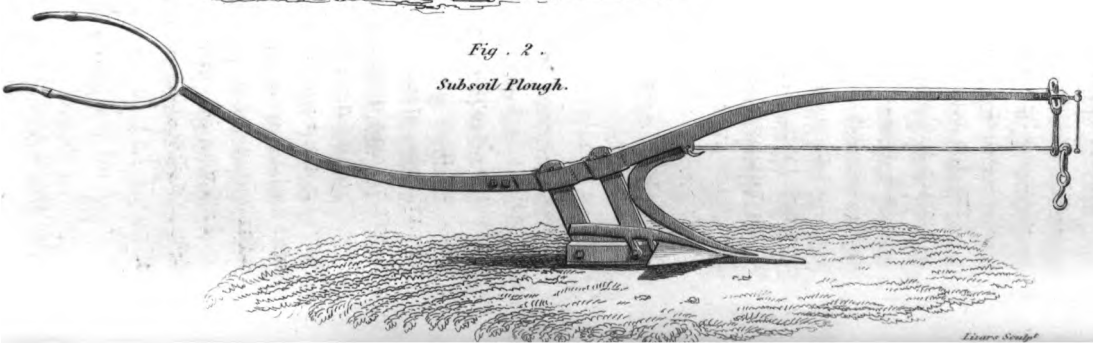


Fig. 2.

Subsoil Plough.



Lizars Sculpt.

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REPORT ON THE DISTRICT OF KELSO.

[The Highland Society has recently offered an honorary premium for the best account of any district in Scotland, with reference to the present state of husbandry, and the progress of rural and general improvement; it being required of the writer more especially to advert to the character of the soil and surface, the breeding of cattle, the state and management of roads, and to offer such suggestions as might admit of practical application, regarding the future improvement of the district. Several reports have accordingly been received; and the Society has ordered the following to be printed as the commencement of a series.]

REPORT ON THE DISTRICT OF KELSO. *By* JOHN DUDGEON, *Esq. Spylaw.*

The district comprehended in the following report is not less worthy of notice as regards its advancement in agriculture, than it has hitherto been celebrated for the beauty and variety of its scenery. Embracing within its range the parishes of Kelso, Ednam, Sprouston, Linton, Eckford, Crailing, Roxburgh, and Mackerstown, it may justly be said to include the most important part of the county of Roxburgh as respects culture and fertility; and its husbandry being under the direction of a class of men not excelled, in intelligence and discrimination, in any other quarter of the island, a sketch of the present state of the rural economy of such a district becomes particularly worthy of notice.

It would be vain to attempt a picturesque description of a

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country which has justly excited universal admiration, for the varied attractions of its surface, whether viewed in open stretches as it expands along the courses of the rivers, or examined in the detail of its more minute and individual beauties. Nor, perhaps, is it required for the purpose of this notice that such should be tried. It will be sufficient to afford some notion of its general surface, to observe, that the Rivers Tweed and Tiviot entering the district at the upper or western line of boundary, about four miles distant from each other, run for some time nearly parallel through the district, until gradually approaching, by the Tiviot's assuming a northern course as it advances, they converge near the centre of the country embraced in this account a little above Kelso Bridge. The Tweed now, including the waters of the smaller river, flows still nearly through the middle line of the district, passing out at its eastern boundary. The low lands lying along the channels of these rivers, thus exhibit the country as forming two valleys expanding as the rivers come in contact, and swelling into one open vale below their junction. There is occasionally a considerable breadth of rich haugh land upon the immediate borders of the water, while again, at intervals, the banks rise more abruptly, and little of the river is seen from any given point.

Upon entering the district from the west, and while the distance which separates the rivers is still considerable, the land rises to a moderate height between them, forming a flattish moor upon its most elevated range, which is gradually narrowed as the waters approach each other. From the courses of the rivers the country is gradually elevated, until, as in the parish of Linton and part of Eckford, the land again reclines to meet the waters of the Kail, forming there also a strath or vale of limited extent along the sweep of that river.

The soil, as may naturally be supposed in a country of such extent and so varied a surface, is of a variety of qualities, and partakes of different natures; but its general character is

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that of a free sandy loam upon an open subsoil. There is, however, no inconsiderable portion of that part of the district lying upon the more elevated slopes, apart from the rivers, which is of a more clayey quality, and for the most part resting upon a close retentive bottom. And, again, as the country rises to the highest ridges between the valleys, the soil is generally a thin clay or moor, upon a close and nearly impenetrable condensed sand and yellow clay.

Mode of Culture.—It not unfrequently occurs that the proceedings of the majority impart a general feature to the operations of the whole; and hence it is that, notwithstanding the variety of soil above described, there is a pretty general mode of culture prevalent throughout the entire district,—the leading characteristic being that of a rotation of five years. The far greater proportion of the soil being well adapted for the successful cultivation of turnips, that crop very generally forms the foundation of the course pursued; and perhaps there is no part of the island where the preparation of the soil for the raising of this valuable esculent is better understood, and where its cultivation is carried on with so much attention to cleanness and neatness as upon the immediate banks of Tivlot and Tweed. The drill system is universally pursued. The drills range in extent from 26 to 30 inches, the medium of 28 inches being that generally adopted, the dung (previously well fermented and prepared by turning) being applied in the drill, with few exceptions, immediately before sowing. From the great breadth occupied by this crop on many farms, the operation of sowing is frequently not concluded until the early part of July, and in the majority of seasons the turnip sown even at this late period proves a valuable crop for spring food; but, in general, the best season for sowing is considered to be, for Swedish turnips, during the last week of May, and, for the varieties of the white species, from the beginning until the middle of June. Three-

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fourthsof this crop, upon the drier lands, are eaten upon the ground by sheep, a proportion of the whole being generally, what is technically called, *stripped* and carted home for soiling. The land is now ploughed or cleared; that part where the crop is early consumed being often followed by wheat; while the later cleared ground, and by far the larger proportion of the whole, is reserved for barley. These crops are also not unfrequently drilled or ribbed, and the lands being now sown down with grass-seeds, are depastured the two following years, a proportion being the first year cut for hay. Oats are almost the invariable crop which follows when the pasture lands are again subjected to the plough, although upon some fine haugh land, wheat has been occasionally grown at this stage of the course with some success.

This concludes the rotation,—turnips again following; and no manure of any kind is applied to the intermediate corn crops, even when it has been thought advisable to take a wheat crop in the last of the course.

The above is given as the general mode of management throughout the district, but, as may be supposed, there are many exceptions to the uniform practice of this course; although there is little doubt that, for a period of any considerable extent, where there is no access to an extra supply of manure, the grazing for two years will prove ultimately the most profitable system of occupation.

On much of the lands of a first rate quality, or of a stronger nature, a four shift rotation is pursued—while a plain fallow is sometimes adopted on the latter description of soils, in the room of a turnip crop. And here, it may be observed, with reference to the general remark at the outset of this branch of the subject, that it is to be regretted that a less limited adoption of plain fallows is not practised; as in many cases, where the soil is not properly suited for the culture of turnips, such as upon thin wet lands, and those generally upon a retentive subsoil, much deterioration is occasioned,—the whole course of crops being of a very inferior description,

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from an unsuccessful attempt (which holds in the far greater number of seasons) to form a turnip crop.

Potatoes are grown to a very trifling extent, as it may be presumed must be the case, where the supply is limited alone to the internal demand. Hay also is only grown to meet the necessities of a home consumption, which, however, from the quantity of stock maintained, is not very limited.

General Improvements.—In a district where the most improved system of agriculture is in very general operation, and has been long followed, it is not to be expected that any particular rural improvement is so prominently marked, as to require individual notice. The mode of tillage pursued is generally that which characterizes the most advanced state of husbandry; and it is satisfactory to observe, that, notwithstanding the prevalence of rather untoward times for the agriculturist, the face of the district yet exhibits few symptoms of retrogression. The application of lime has, until very recently, been much adopted, and still continues to be practised to some extent; and although to the cost of this expensive manure falls to be added the additional and greater outlay of a twenty miles' land carriage (which may be said to be the average distance to which it is conveyed throughout the district), much benefit has been found to accrue from its free use. The quantity applied varies from 140 to 200 bushels per acre, and upon some stronger soils 240 bushels have been given with good effect. It is generally put on in the spring or summer season in a newly slaked state, immediately preceding the preparation for a turnip or fallow crop; but some successful agriculturists prefer applying it in the previous autumn to those lands intended for turnip, with a view to obviate the risk of not obtaining a regular and vigorous vegetation, when the lime has been so recently applied in a hot state. The writer, who has himself, within the last five years, applied considerably upwards of 20,000

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bolls to land within the district, prefers the former season; but it is no doubt essential, when put on during the summer, that the land should have two furrows if possible before forming the drills for turnips, and one *at least* previous to the seed furrow, when the land is intended for wheat.

It may here be remarked, that, although lime is not in every instance a preventive of the evil termed "finger and toe," affecting turnips, there are so few exceptions to its efficiency for this purpose, that it may almost be considered an established remedy for that ruinous disease, when applied in a sufficient quantity, and in a proper state. With a plain fallow, subsequent to the application of the lime, there is little doubt it would prove, in most instances, completely efficacious.

Bone-manure has only very recently been tried in this district, and there is no question of its efficacy upon light dry soils—while upon greasy wet lands, there seems as little doubt of its inutility. The quantity used here has not yet been very considerable, although several individuals have employed from 50 to 100 quarters annually during the five past years, the application being at the rate of two quarters per acre. The expense of applying this manure being so very trifling, from the comparatively light carriage, its use has become a matter of much consequence upon outfield and steep lands—enabling the farmer to render his farm-yard dung available to better purpose, where the carriage is more easily effected.

Draining is an improvement in constant operation, although, perhaps, not adequately understood in many instances,—at least there is great room for its being pursued on a more extensive scale on many farms than has hitherto been the case.

Roads.—Much has been effected within these few years in the amelioration of the parish roads, and they are gradually

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attaining to a perfection which reflects much credit upon the trustees to whose management they are legally entrusted; and from the substantial state of repair to which they are being subjected, a considerable saving will soon be apparent in the expense of maintaining them. The system of Macadam, upon a restricted scale, is now universally adopted when any new work is undertaken; and a mode of giving a greater slope to the sides of the metalled part lately resorted to, has been productive of great benefit, and is worthy of imitation on all roads where a constant attendance of labourers is from circumstances impracticable, or, perhaps, cannot be afforded.

Private or field roads are now becoming an object of more universal attention, and are also daily on the increase.

Plantations.—A very considerable addition to the extent of lands planted has been made within the last eight or ten years, which, in many instances, promise to be of much utility in improving the climate of the higher districts, and in affording shelter to stock lands. Much, however, may still be added with good effect in this way, and it would be well that young plantations were laid out more with a view to the desirable end just alluded to, as it is chiefly for this purpose, combined no doubt with that of ornament, that they will be found available, at least for very many years.

Size of Farms.—Farms are, in general, of very considerable magnitude in this part of the country, a very large proportion being in extent upwards of 500 acres; while, in numerous instances, twice that quantity of arable land is in the hands of one individual; and there are several cases within the district where many hundred acres more are in the occupation of one tenant, who thus affords support to several hundred individuals. The condition of the peasantry

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is highly respectable, and the principal servants being paid mostly in kind, their situation is in general very comfortable.

Implements.—This head is introduced, not with any intention to enumerate the various articles of this kind in common use, but to notice the utility and advantage of the prevalent adoption of one or two implements of less general notoriety. These are, the drill and broad-cast machines for sowing all kinds of crop. The former is particularly beneficial where the land is infested with annual weeds, enabling the farmer by hand-hoeing to obviate any deterioration of the crop from the over luxuriance of these enemies to productiveness. Even when the land is free from these scourges, the employment of this machine, and subsequent process of hoeing, is found to be very salutary and beneficial, and the expense of additional labour is amply repaid by the saving of fully a bushel of seed per acre. The machine for sowing broad-cast is also, as used here, a very perfect instrument, performing that operation in the most satisfactory manner. On its first introduction, it was applied solely to the sowing of grass-seeds, which being then deposited in a very superior style, gave rise to its application being extended to the sowing of corn of all descriptions; and the machine having undergone various alterations and improvements with this view, it is now as perfect an instrument as it is possible to conceive for this purpose, depositing the seed in the most regular manner, and thus producing a *braird* far superior to that effected by the most expert sower in the most favourable state of the weather,—not to mention that, being available in the most boisterous day, much valuable time is often thus gained. The saving of seed also in comparison with hand-sowing, from the equal and effectual manner in which it is given out, is fully above a bushel an acre as regards oats, and about half a bushel when wheat and barley are the grain sown.

Iron ploughs have now almost universally superseded those

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of wood, and harrows of the former material are also gaining ground. Finlayson's harrow has not yet been much tried in this part of the country, but there is no question that its more general adoption would be found of much practical benefit, a great proportion of the soil being well suited for its successful application in the cleaning process. And it is particularly worthy of attention how far its use may successfully supersede that of the plough, upon light open soils, in the preparation for a turnip-crop, where it is often of great moment not to overwork the land, and to obviate its getting too dry previous to sowing, which, when it is much infested with couch, is very apt to be the case, thus occasioning a failure of this essentially necessary crop upon such land.

Live Stock.—From the large proportion of land in grass throughout the district, it follows that a very material part of the farmer's revenues arises from the produce of stock.

The improved Leicestershire breed has long been the established sheep-stock over nearly the whole district, it only being upon the highest ridges of the country that a Cheviot breed of sheep is partially kept. The pains and expense bestowed in the culture and improvement of this most important branch of rural economy, have raised the character of this part of the country for its breed of Leicesters, which is surpassed by that of no other district in Scotland; and it is not perhaps saying too much to add, that, in this respect, it would successfully vie with many of the highest note in the more southern part of the kingdom.

On nearly all farms of any considerable extent, what is called a breeding-stock of these sheep is kept, and the system pursued is generally the following: From the ewes three successions of lambs are taken, the dams being sold off at the close of their third breeding-season, or when four and a half years old. In general, the whole produce of these ewes is retained upon the farm on which they are bred, a proportion

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of the ewe-lambs, when gimmers, coming in to take the place of the old ewes sold in each year. The wedder-lambs, again, are disposed of as fat, after being fed on turnips for two successive winters, in the spring or winter of the third year, when diamonts or two-shear sheep. Not unfrequently, however, upon such farms, where a large proportion of turnips cannot be raised, the whole wedder-lambs, and sometimes part of the ewe-lambs, are disposed of at weaning-time; and those ewe-lambs kept beyond the number required to maintain the complement of the year, are sold when gimmers, generally at about eighteen months old. These young sheep being thus so early matured for the butcher, are maintained, from their earliest time, on full feed, it being a great object to prevent them losing any of the condition they generally possess when taken from the ewes. With this view, also, they are early put upon turnips, as it is very desirable they should be well acquainted with this their essential means of support, previous to any failure in the nutritious properties of the grass, or the occurrence of severe weather. When either of these events takes place, the turnip forms the chief or only source of their subsistence.

To the young stock intended to be kept for breeding, fewer turnips are commonly allowed, although they are seldom, during any part of the winter, entirely deprived of this useful assistance. The ewes having at this season the range of the whole pastures, are only allowed auxiliary food during the severity of a storm, and in hard winter weather, until towards the approach of the period of lambing, when a proportion of turnips becomes indispensable to maintain them in sufficient condition to bring them well through this critical and interesting season.

The cattle stock of the district may be said properly to consist of the short-horned or Teeswater breed, at least great pains are taken to obtain that admired breed, in as pure and improved a state as it can possibly be produced; and it must

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be admitted, that in not a few hands within the bounds included in this notice, are to be found some of the finest specimens of short-horns of which Scotland can boast. The liberality and exertions of the Border Union Agricultural Society, whose annual exhibitions are held at Kelso and Coldstream, have undoubtedly contributed largely to effect this end, by cherishing and exciting a spirit of praiseworthy rivalry in this important branch of agricultural science, which has been productive of universal benefit. The premiums paid by that Society for bulls alone amount annually to L. 100, and by this liberality the Society has succeeded in bringing forward a display of these animals, which, it is confidently presumed, is not equalled at any similar exhibition in this part of the island.

Although not entirely a breeding district for cattle, a considerable number are reared within its bounds, it being pretty generally the custom that a few calves are raised, perhaps, upon an average, about two to the three hundred acres. These are grazed and retained upon the farm until fed off, commonly at three years old, although by forcing, or being kept on the best food, from their earliest age, they are not unfrequently prepared for the butcher, at the conclusion of their second year; and it is not uncommon to see animals of this age produced at the Kelso spring market, of sixty stones weight.

The accommodation afforded for the successful management of cattle, during the winter months, within the district, is now generally pretty extensive, and has of late been becoming more an object of attention in the construction of those farm-offices undergoing improvement or being rebuilt. These conveniences consist of small courts, with shelter-sheds; and the whole cattle are, in those steadings best arranged with this view, accommodated in classes according to their respective ages and sizes. As has been noticed with respect to sheep stock, it is considered essential, with a view to early maturity, that the condition at any time acquired should not be lost,

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and that consequently those cattle intended to be early prepared for the butcher, are, from the first kept upon a full allowance of nutritious food, being early supplied with turnips, of which a considerable quantity is afforded them even during their first winter. It seems general, indeed, that the calves have a pretty full allowance of this necessary article given them in the first season, even when they are not intended to be fed off until the third year, the intervening winter being that in which it is considered they can with the least detriment dispense with the aid of the turnip.

The number maintained in one court, necessarily varies with the size of the accommodation afforded, but there is no question that the fewer put up together, while under the process of being fed, the more speedy will be their arrival at maturity; and although the general number here confined to the same bounds, under such circumstances, may be stated to vary from eight to twelve, accommodation of a temporary nature is often afforded for a much more extended distribution of the feeding stock. These are early brought into shelter, it being considered advantageous to supply them with turnips as soon as this more nutritious food is ready for being taken from the ground, the white species of course forming the first in the order of consumption, and the Swedish taking their place, when the succulence of the former begins to diminish. On the regular and full supply of this food, the entire dependance of the feeder is placed, the only other allowance to the oxen in nearly every instance being oat-straw, with a plentiful proportion of litter, when that very necessary commodity can possibly be obtained. It not unfrequently happens, however, that to those of the cattle retained until the close of the spring, hay is given in lieu of straw; and a few potatoes at this season are also occasionally added to their other allowances; a practice, which, when cautiously followed, is invariably attended with good success.

A considerable number of horses is also reared, both for the

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saddle and draught, but certainly not in sufficient quantity to supply the country demand, although most farmers make it their endeavour to breed as many as to meet their own necessities, and to keep up the number of their working stock in an effective state. In this, however, they seldom succeed, and consequently a considerable number of horses is annually required from other parts.

In conclusion, it may not be out of place to notice, that, owing to a great proportion of the soil in the district being of a secondary quality, and the heavy expense of land carriage bearing hard upon a lower scale of prices, it is to be feared that the continued prevalence of a depression in the value of agricultural produce, must soon lead to the decay of the boasted fertility resulting from the spirited system of operations at present pursued. Whether the legislature may interfere to prevent this threatened consummation, it is difficult to know; but it is worthy the serious consideration of those mainly interested in supporting the value of land in this part of the country, how far one of the disadvantages under which it has been stated to labour may be removed, by bringing about the accomplishment of the long contemplated and matured plan of a communication with the coast, by means of a railway. The effective nature and importance of this mode of economical conveyance being now eminently increased, there can be no question as to the ultimate success of such an undertaking. It is to be regretted, then, that the circumstances of some of those interested in the promotion of the work should ever have thrown an obstacle in the way of its construction. But now it resolves itself into a matter of calculation with many who still possess the power to carry through so important an object, how far the reduction which must take place upon the value of land under existing circumstances, may be obviated by the completion of the proposed railway.

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ON THE IMPROVEMENT OF A TRACT OF BARREN SOIL. *By the Reverend Dr* SINGER. *In a Letter to the Deputy Secretary.*

THE feature of prominent importance in this operation, is the conversion of yellow spongy peat-moss (in its natural state quite sterile, and almost of no value), into peat-earth, fertile and productive. Every one knows, that, in practice, this variety of moss is generally considered incapable of improvement; and, if it cannot be destroyed by fire, or carried off by water, it is commonly abandoned to its natural sterility. Some have bestowed uncommon pains and expense in reducing such a tough worthless kind of moss, by spade-work and manuring; in which they have at last succeeded, but not with advantage, the outlay commonly far exceeding the returns. Others have been at the enormous expense of covering it with earth, or with black friable moss; and yet the improvement has not been complete, because the yellow spongy moss below has not been duly reduced.

In order to this reduction of barren tough peat-moss into fertile peat earth, or soil, on a great scale, it is necessary to drain, to stir, and manure it, and to allow time for its reduction; but, in the mean time, some returns may be drawn from it, and pasturage materially contributes to the change; yet this is not completed at the surface, till the soil has been again stirred; in doing which ample returns in corn may be expected, and the worst surface known may at last become a smooth fresh meadow, which is one of the most valuable. Such is the system observed in improving those parts of the barren lands to which this communication chiefly refers.

It is well known that by draining black or brown solid moss, and by either paring and burning the surface, or by digging and levelling, together with manuring and cultivation, it may soon be reduced, and with a reasonable pros-

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peet of yielding a recompense for the labour and outlay bestowed on it; also, that dry muir lands may be improved by lime and other manures, conjoined with the plough; but it does not so readily occur, how tough light peat-moss can be improved to real advantage, and few seem to be aware of a system, by which it can, without a sacrifice of outlay, be turned into smooth and productive meadows.

The first step in the system, that of draining, is known to every one; and this operation causes the moss to sink and consolidate, by which it is gradually prepared for farther operations. Time and pasturage may do something for its amelioration when it is thus rendered dry and firm. Then, if the tough spongy surface can be destroyed by paring and burning, so as to reach a dark solid moss below, the improvement may be soon and profitably accomplished; but if the tough and spongy moss be too deep to be removed, then it is commonly left as a hopeless and impracticable subject. If it be a thin stratum all of the same kind, over a wet stony bottom, it is still more worthless and hopeless. Yet both of these descriptions have been turned into meadow, after having yielded fair returns for outlay, and are included as part of the subject of this communication.

The whole land improved, consisting of thirty acres, was enclosed by a ditch, which contributed, of course, to drain it, and by a hedge. One subdivision hedge and ditch was made for this and other purposes, and these fences were of some use to shelter the stock when introduced. A road and wooden bridge rendered the lands accessible; many open drains were made for drawing off the surface-water; and several hundreds of roods of covered drains were cut, in order to remove the under water; which last sort of drains were filled with small stones collected on the surface, to the depth of above a foot, on which turf or divots were placed, and covered above with soil. At least six hundred cart-loads of larger stones were quarried out and carried off, to be applied

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in building walls elsewhere. It is not easy to find a subject that required more expense, and promised less return.

The arable part was only about six acres, and it was so poor and foul, when ploughed and sown (in order to reduce it), that it yielded little more than the seed. This part was of course fallowed, manured with lime and dung, and then sown down into grass. It was a green fallow, partly with potatoes and partly with turnips.

The solid parts of the peat moss were pared and burned, levelled, and ploughed into narrow ridges, which were limed, and sown with early oats and meadow seeds.

All the rest consisted of tough spongy moss, utterly barren, and mostly very uneven in the surface. It was pared and burned, levelled and drained, and, after consolidating, limed on the surface, and ploughed the second year after being thus manured. The crop was better than had been expected; and the land was harrowed as well as was practicable in thus laying it down. Young cattle and sheep were sent to pasture in it the first crop of grass, which was but scanty, and afterwards all the farm stock was allowed to pasture in it for some years.

The surface was still rather dry and uneven, and of course not productive; but the moss below was resolved into soil. To complete the operations, the whole was again broken up by the plough; and the barren surface turned down to be reduced, as the subsoil was then found to be. Excellent crops of corn were obtained by this second ploughing; and the soil being all mixed and smoothed, was again sown down in meadow grass seeds, collected from the stacks of hay obtained from other meadows, and consisting of a great variety of seeds, in which the woolly holcus, the poas, fescues, bent grasses, hair grasses, and others appeared; to which were added some goose-grass seeds, in order to thicken the first year's crop of hay, and some rye-grass for subsequent years also, and timothy, which it was hoped would remain.

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The black moss being more solid yielded better and heavier crops of oats than the arable dry lands did, and the reduced spongy moss was little if at all inferior. As to the grass, it was a fair crop, and in some places it was even abundant.

About an acre of the moss which had been drained, pared and burned, and levelled, was limed on the surface, for the purpose of comparison. In that state it remains, never having been either dug or ploughed. It yields almost nothing; but furnishes evidence of the value and efficacy of what was done for the other parts, originally even worse than it. As much is learned by the want of success on lands not fully improved on a proper system, as by the success of improvements duly carried on to an end. Peat-moss must be stirred up by the spade or the plough, and turned over, in order to its perfect reduction into soil; and time also is required to accomplish this, to which pasturage of live stock very materially contributes. I allude, of course, to peat mosses not already reduced by the operation of natural or artificial causes.

The total expense, during six years, for the improvement of these thirty acres, came to . . .	L.311	18	9
And the returns in crops and pasturage moderately computed, came to about . .	202	13	0
So that the surplus advanced (rents included), was	L.109	5	9

But, in the course of breaking up a second time, this advance was fully made up; and, by the fourteenth year of possession, the lands had more than returned all rents, outlay and interest. A moderate estimate of their returns, for the last seven years, indicates a profit of L. 175 on the lease. At any rate, there must be a profit of above L. 5 per acre on the whole, besides the accommodation of such a subject for giving useful employment to a team, and convenient arrangement

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for occupying other lands while these were in grass, in favour of the tenant.

As to the benefit of such a system to the landholder, it requires no illustration; but, to the public, it is not easy to ascertain the benefits of such a system, giving useful employment and the means of subsistence to labourers, and turning as barren a subject as can well be met with into fertile meadow and arable fields.

On the thirty acres above mentioned, the former occupant said he thought that three cows might be coarsely and sparingly pastured; but, as to crops of hay or corn, they were, in the natural state of these lands, out of the question. If now all laid down to pasturage, they would feed at least four times as many cattle, and a great deal better; while as to crops of good corn, and hay of a substantial quality for cattle, the returns are equal to those of almost any other lands of the neighbourhood.

Let this view be applied, in connexion with the vastly extensive and yearly increasing fields of spongy peat, almost wholly useless to the community. Let it be ascertained, from the above undeniable facts, and by others of a similar character, that such a soil is really capable of being improved, and so as to leave a profit even to the farmer on a lease of twenty-one years, and far more to the benefit of the landholder, but incomparably more to the benefit of the public and of the kingdom; let it be ascertained what time and aid are necessary, in order to enable occupants of the very worst peat mosses to turn them into fertile meadows; and no one can say what extent of benefit may be the result.

The writer of this humble but accurate statement has often wondered, that, after the public were in possession of such works as those of Aiton and others on peat-moss, hardly any attempt was ever made on many enormous fields of such a soil, in a state almost wholly useless and even dangerous. A late lamented and right honourable lady asked him to inquire of

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one of her tenants, what sum he would accept of from her to give up for improvement a field of about a hundred acres of moss; and his answer was, that if her ladyship would enclose it off the farm, she was welcome to the whole of it gratis. In visiting the operations of an intelligent landholder, who was paring great masses of spongy peat, in order to removal and level the surface, to be covered with black peat from below, a friend observed, that mattresses could be taken out there for the Duke of Wellington's army. No one ever surveyed the many thousands of acres of Lochar Moss, without regretting that such a nuisance continued so near Dumfries, in so fine a country too; and, when a plan of draining the whole was given by Smeaton, about eighty years ago, when the late Baillie Shaw had made such a conquest of a small part of it, eleven feet deep, and when Nature had pointed out along the intersecting rivulets, into what rich and verdant meadows it was possible by irrigation to convert the moss. If it be the fetters of entail that prevent the improvement of a moss, so useless and even hurtful, but which could not be over estimated, if turned into decent pasture, at ten thousand pounds a-year, surely the Legislature would be inclined to relax these fetters, in so far, at least, as to open such fields of employment and subsistence for the benefit of a rapidly increasing population.

KIRKPATRICK-JUXTA, 31*st December* 1830.

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ON THE PRICES OF GRAIN FROM 1647 TO 1829 INCLUSIVE.

Communicated by Mr ALEXANDER STEWART, Haystoun.

THE late fall of agricultural produce, and particularly of live stock and wool, having induced several proprietors to let their lands for so much grain payable by the fiars, and the price of grain being subject to much fluctuation, I drew up the following table, with the view of finding, as nearly as possible, the average price of nineteen years, which are the ordinary currency of a lease. The fiar price of grain in the county of Haddington goes farther back than that of any other county to whose records I have had access, and the grain produced there is, I believe, among the best in Scotland. For these reasons, I have taken the second fiars of that county, believing that they may come nearest to an average with the highest fiars of other counties.

The average price of grain has nearly doubled for thirty years prior to the year 1817; and on looking into my own accounts, I find that the articles of expenditure have also nearly doubled. There is no alteration in the measure of grain, so far back as I have gone, in stating the prices. The standard measure was fixed in the year 1618. The firlot contains the same fills of the *jug*. I have weighed the water contained by the latter, and find it to give the same weight as that announced at the time, viz. 3 lb. 6 oz. Troy weight.

[To Mr Stewart's tables there have been added the prices for the imperial measure, while it has been judged more expedient to present the whole in continuity, without reference to the periods of nineteen years, into which the tables, in their original form, were divided.]

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SECOND FIAR PRICES OF GRAIN FOR THE COUNTY OF HADDINGTON.

Years.	WHEAT.						BARLEY.						OATS.					
	Per Linlithgow Boll.			Per Imperial Quarter.			Per Linlithgow Boll.			Per Imperial Quarter.			Per Linlithgow Boll.			Per Imperial Quarter.		
	L.	S.	D.	L.	S.	D.	L.	S.	D.	L.	S.	D.	L.	S.	D.	L.	S.	D.
1647	0	16	8	1	13	4½	0	11	8	0	16	0¼	0	9	6	0	13	0¼
48	1	3	10½	2	7	9	0	13	4	0	18	3½	0	11	4	0	15	6¾
49	0	16	8	1	13	4½	0	13	10	0	18	11¾	0	11	6	0	15	9½
50	1	2	4	2	4	8¾	1	4	1	1	13	0¾	0	17	6	1	4	0½
51	1	0	10	2	1	8¾	1	1	3	1	9	2½	0	16	1	1	2	1
52	0	16	8	1	13	4½	0	14	2	0	19	5½	0	12	6	0	17	2
53	0	10	6	1	1	0¼	0	8	4	0	11	5¼	0	5	6	0	7	6½
54	0	6	8	0	13	4¼	0	7	2	0	9	10	0	3	10	0	5	3
55	0	8	10	0	17	8¼	0	8	4	0	11	5¼	0	4	2	0	5	8¾
56	0	11	8	1	3	4¼	0	8	10	0	12	2¼	0	5	6	0	7	6½
57	0	11	1	1	2	2¼	0	14	2	0	19	5½	0	6	1	0	8	4
58	0	18	4	1	16	8¾	0	13	4	0	18	3½	0	9	2	0	12	7
59	0	18	0	1	16	0¾	0	12	9	0	17	6	0	10	0	0	13	8¾
1660	0	15	0	1	10	0½	0	11	1	0	15	2½	0	8	10	0	12	2¼
61	0	18	4	1	16	8¾	0	13	4	0	18	3½	0	8	4	0	11	5¼
62	0	15	0	1	10	0½	0	10	6	0	14	5	0	6	8	0	9	1¾
63	0	12	9	1	5	6½	0	9	5	0	12	11	0	6	1	0	8	4
64	0	9	5	0	18	10¼	0	6	8	0	9	1¾	0	4	2	0	5	8¾
65	0	10	10	1	1	8¼	0	6	8	0	9	1¾	0	4	5	0	6	0¾
66	0	7	11	0	15	10¼	0	7	6	0	10	3¼	0	5	10	0	8	1
67	0	7	9	0	15	6¼	0	8	4	0	11	5¼	0	5	0	0	6	10½
68	0	9	5	0	18	10¼	0	8	10	0	12	2¼	0	4	10	0	6	8½
69	0	9	4	0	18	8¼	0	10	0	0	13	8¾	0	5	6	0	7	6½
1670	0	9	5	0	18	10¼	0	8	4	0	11	5¼	0	6	8	0	9	1¾
71	0	16	8	1	13	4½	0	9	8	0	13	3¼	0	9	0	0	12	4¼
72	0	10	0	1	0	0¼	0	9	4	0	12	9¾	0	6	1	0	8	4
73	0	10	0	1	0	0½	0	9	5	0	12	11	0	6	8	0	9	1¾
74	1	0	6	1	1	0¾	0	15	10	1	1	8¾	0	12	11	0	17	8¾
75	0	18	4	1	16	8¾	0	18	4	1	5	2	0	11	8	0	16	0¼
76	0	11	1	1	2	2½	0	8	0	0	10	11¾	0	4	8	0	6	5
77	0	11	1	1	2	2½	0	8	4	0	11	5¼	0	5	5	0	7	5¼
78	0	12	6	1	5	0½	0	7	10	0	10	9¾	0	4	8	0	6	5
79	0	15	0	1	10	0¾	0	8	10	0	12	2¼	0	5	6	0	7	6½
1680	0	10	0	1	0	0½	0	8	4	0	11	5¼	0	5	10	0	8	1
81	0	10	0	1	0	0½	0	8	4	0	11	5¼	0	8	0	0	10	11¾
82	0	12	8	1	5	4½	0	13	4	0	18	3½	0	8	10	0	12	2¼
83	0	11	1	1	2	2½	0	8	10	0	12	2¼	0	5	6	0	7	6½
84	0	11	1	1	2	2½	0	7	10	0	10	9¾	0	6	1	0	8	4
85	0	9	8	0	19	4¼	0	8	4	0	11	5¼	0	5	6	0	7	6½
86	0	10	0	1	0	0¼	0	10	3	0	14	0¾	0	5	6	0	7	6½

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Years.	WHEAT.						BARLEY.						OATS.					
	Per Linlithgow Boll.			Per Imperial Quarter.			Per Linlithgow Boll.			Per Imperial Quarter.			Per Linlithgow Boll.			Per Imperial Quarter.		
	L.	S.	D.	L.	S.	D.	L.	S.	D.	L.	S.	D.	L.	S.	D.	L.	S.	D.
1687	0	8	0	0	16	0¼	0	8	4	0	11	5¼	0	5	6	0	7	6½
88	0	8	4	0	16	8¼	0	8	4	0	11	5¼	0	6	8	0	9	1¾
89	0	13	0	1	6	0½	0	9	4	0	12	9¾	0	7	10	0	10	9¾
1690	0	14	4	1	8	8½	0	13	10	0	18	11¾	0	9	4	0	12	9¾
91	0	12	1	1	4	2½	0	8	2	0	11	2½	0	5	10	0	8	1
92	0	11	1	1	2	2¼	0	8	8	0	11	10¾	0	6	1	0	8	4
93	0	14	0	1	8	0½	0	10	0	0	13	8¾	0	7	0	0	9	7¼
94	0	13	4	1	6	8½	0	10	0	0	13	8¾	0	7	6	0	10	3¼
95	0	16	0	1	12	0½	0	12	8	0	17	4¾	0	11	1	0	15	2½
96	1	1	1	2	2	2¼	0	19	2	1	6	4	0	14	2	0	19	5½
97	0	19	2	1	18	4¾	0	14	5	0	19	9½	0	9	10	0	13	6¾
98	1	5	6	2	11	1	1	2	2	1	10	5½	0	16	1	1	2	1
99	1	3	10	2	7	8¾	0	19	5	1	6	8	0	14	5	0	19	9½
1700	0	15	0	1	10	0½	0	14	5	0	19	9½	0	8	10	0	12	2¼
1	0	10	3	1	0	6¼	0	9	5	0	12	11	0	6	8	0	9	1¾
2	0	10	0	1	0	0¼	0	10	0	0	13	8¾	0	7	2	0	9	10
3	0	13	4	1	6	8½	0	11	8	0	16	0¼	0	7	6	0	10	3¼
4	0	11	8	1	3	4¼	0	9	10	0	13	6¾	0	7	6	0	10	3¼
5	0	9	5	0	18	10¼	0	9	2	0	12	7	0	6	8	0	9	1¾
6	0	7	9	0	15	6¼	0	7	2	0	9	10	0	4	2	0	5	8¾
7	0	10	10	1	1	8¼	0	7	2	0	9	10	0	6	1	0	8	4
8	0	14	2	1	8	4½	0	11	1	0	15	2½	0	8	4	0	11	5¼
9	1	0	0	2	0	0¾	0	13	8	0	18	9	0	11	1	0	15	2½
1710	0	12	10	1	5	8½	0	12	6	0	17	2	0	9	5	0	12	11
11	0	12	6	1	5	0½	0	10	10	0	14	10½	0	7	6	0	10	3¼
12	0	12	6	1	5	0½	0	9	5	0	12	11	0	7	2	0	9	10
13	0	16	8	1	13	4½	0	10	10	0	14	10½	0	7	9	0	10	7½
14	0	11	8	1	3	4¼	0	11	8	0	16	0¼	0	8	4	0	11	5¼
15	0	13	4	1	6	8½	0	10	5	0	14	3¾	0	8	4	0	11	5¼
16	0	11	8	1	3	4¼	0	8	7	0	11	9¼	0	6	11	0	9	6½
17	0	11	8	1	3	4¼	0	8	7	0	11	9¼	0	8	0	0	10	11¾
18	0	11	8	1	3	4¼	0	10	0	0	13	8¾	0	7	11	0	10	11
19	0	11	10	1	3	8¼	0	11	8	0	16	0¼	0	9	2	0	12	7
1720	0	11	4	1	2	8¼	0	11	1	0	15	2½	0	7	10	0	10	9¾
21	0	12	8	1	5	4½	0	9	2	0	12	7	0	7	6	0	10	3¼
22	0	14	2	1	8	4½	0	10	10	0	14	10½	0	8	10	0	12	2¼
23	0	12	6	1	5	0½	0	12	8	0	17	4¾	0	9	4	0	12	9¾
24	0	13	4	1	6	8½	0	10	6	0	14	5	0	8	0	0	10	11¾
25	0	15	10	1	11	8½	0	10	0	0	13	8¾	0	8	6	0	11	7¾
26	0	13	4	1	6	8½	0	9	8	0	13	3¼	0	8	0	0	10	11¾
27	0	14	8	1	9	4½	0	11	4	0	15	6¾	0	8	4	0	11	5¼
28	0	14	8	1	9	4½	0	13	4	0	18	3½	0	10	6	0	14	5

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Years.	WHEAT.						BARLEY.						OATS.					
	Per Linlithgow Boll.			Per Imperial Quarter.			Per Linlithgow Boll.			Per Imperial Quarter.			Per Linlithgow Boll.			Per Imperial Quarter.		
	L.	s.	D.	L.	s.	D.	L.	s.	D.	L.	s.	D.	L.	s.	D.	L.	s.	D.
1729	0	13	10	1	7	8½	0	10	4	0	14	2¼	0	9	4	0	12	9¾
1730	0	12	2	1	4	4½	0	8	4	0	11	5¼	0	7	8	0	10	6¼
31	0	10	10	1	1	8¼	0	8	4	0	11	5¼	0	7	3	0	9	11¼
32	0	9	2	0	18	4¼	0	7	0	0	9	7¼	0	6	6	0	8	10¾
33	0	10	4	1	0	8¼	0	9	4	0	12	9¾	0	8	0	0	10	11¾
34	0	14	2	1	8	4½	0	9	6	0	13	0¼	0	7	8	0	10	6¼
35	0	13	4	1	6	8½	0	8	11	0	19	10¾	0	9	2	0	12	7
36	0	11	8	1	3	4¼	0	11	0	0	15	1¼	0	8	10	0	12	2¼
37	0	12	4	1	4	8½	0	11	3	0	15	5½	0	7	8	0	10	6¼
38	0	10	0	1	0	0¼	0	8	4	0	11	5¼	0	6	2	0	8	5¼
39	0	12	6	1	5	0½	0	11	0	0	15	1¼	0	9	2	0	12	7
1740	1	0	0	2	0	0¾	0	16	8	1	2	10¾	0	13	4	0	18	3½
41	0	12	10	1	5	8½	0	9	8	0	13	3¼	0	9	2	0	12	7
42	0	10	3	1	0	6¼	0	10	4	0	14	2¼	0	6	8	0	9	1¾
43	0	8	8	0	17	4¼	0	7	4	0	10	0¾	0	5	10	0	8	1
44	0	8	9	0	17	6¼	0	8	6	0	11	7¾	0	9	0	0	12	4¼
45	0	14	0	1	8	0½	0	10	6	0	14	5	0	9	8	0	13	3¼
46	0	12	6	1	5	0½	0	9	10	0	13	6¾	0	8	4	0	11	5¼
47	0	12	10	1	5	8½	0	10	6	0	14	5	0	7	2	0	9	10
48	0	13	8	1	7	4½	0	10	4	0	14	2¼	0	8	0	0	10	11¾
49	0	12	2	1	4	4½	0	9	2	0	12	7	0	8	4	0	11	5¼
1750	0	12	11	1	5	10½	0	9	7	0	13	2	0	8	8	0	11	10½
51	0	16	2	1	12	4½	0	11	0	0	15	1¼	0	11	0	0	15	1¼
52	0	14	0	1	8	0½	0	12	2	0	16	8½	0	11	8	0	16	0¼
53	0	13	10	1	7	8½	0	12	8	0	17	4¾	0	10	8	0	14	7¾
54	0	11	6	1	3	0¼	0	8	10	0	12	2¼	0	8	2	0	11	2½
55	0	12	10	1	5	8½	0	9	9	0	13	5½	0	10	6	0	14	5
56	1	0	6	2	1	0¾	0	15	1	1	0	8½	0	13	4	0	18	3½
57	0	16	8	1	13	4½	0	14	0	0	19	2¼	0	12	6	0	17	2
58	0	13	6	1	7	0½	0	9	2	0	12	7	0	7	3	0	9	11¼
59	0	12	2	1	4	4½	0	9	9	0	13	5½	0	7	3	0	9	11¼
1760	0	12	0	1	4	0½	0	8	2	0	11	2½	0	7	2	0	9	10
61	0	13	9	1	7	6½	0	8	5	0	11	6½	0	8	0	0	10	11¾
62	0	18	6	1	17	0¾	0	14	7	1	0	0¼	0	15	0	1	0	7¼
63	0	16	1	1	12	2½	0	13	3	0	18	2¼	0	10	2	0	13	11½
64	0	18	1	1	16	2¾	0	13	10	0	18	11¾	0	12	2	0	16	8½
65	0	19	6	1	19	0¾	0	16	0	1	1	11¾	0	14	4	0	19	8
66	0	19	0	1	18	0¾	0	18	11	1	5	11¾	0	14	2	0	19	5½
67	1	0	5	2	0	10¾	0	15	0	1	0	7¼	0	13	8	0	18	9¼
68	0	19	7	1	19	2¾	0	12	0	0	16	5¾	0	9	8	0	13	3¼
69	0	16	6	1	13	0½	0	13	5	0	18	4¾	0	11	0	0	15	1¼
1770	0	16	0	1	12	0½	0	13	8	0	18	9¼	0	11	4	0	15	6¾

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Years.	WHEAT.						BARLEY.						OATS.					
	Per Linlithgow Boll.			Per Imperial Quarter.			Per Linlithgow Boll.			Per Imperial Quarter.			Per Linlithgow Boll.			Per Imperial Quarter.		
	L.	S.	D.	L.	S.	D.	L.	S.	D.	L.	S.	D.	L.	S.	D.	L.	S.	D.
1771	1	0	0	2	0	0¾	0	15	7	1	1	4¾	0	13	6	0	18	6½
72	1	1	0	2	2	0¾	0	17	3	1	3	8¼	0	14	2	0	19	5½
73	1	2	0	2	4	0¾	0	17	10	1	4	5¾	0	13	9	0	18	10½
74	1	0	2	2	0	4¾	0	17	10	1	4	5¾	0	13	4	0	18	4½
75	0	17	9	1	15	6½	0	14	2	0	19	5½	0	10	2	0	13	11½
76	0	17	1	1	14	2½	0	11	4	0	15	6¾	0	10	1	0	13	10
77	0	19	2	1	18	4¾	0	13	7	0	18	7¾	0	11	6	0	15	9½
78	0	17	0	1	14	0½	0	13	9	0	18	10¾	0	11	4	0	15	6¾
79	0	14	4	1	8	8½	0	10	10	0	14	10½	0	9	2	0	12	7
1780	0	19	0	1	18	0¾	0	13	11	0	19	1¼	0	11	6	0	15	9½
81	0	18	11	1	17	10¾	0	12	11	0	17	8¾	0	10	0	0	13	8¾
82	1	3	10	2	7	8¾	1	1	7	1	9	7½	0	17	9	1	4	4½
83	0	19	7	1	19	2¾	0	17	2	1	3	7	0	13	8	0	18	9¼
84	1	0	4	2	0	8¾	0	18	1	1	4	10	0	14	1	0	19	4
85	0	18	11	1	17	10¾	0	14	11	1	0	5¾	0	11	1	0	15	2½
86	0	18	7	1	17	2¾	0	16	5	1	2	6½	0	13	8	0	18	9¼
87	1	0	8	2	1	4¾	0	16	3	1	2	3¼	0	13	4	0	18	3½
88	1	1	2	2	2	4¾	0	14	0	0	19	2¾	0	10	1	0	13	10
89	1	2	4	2	4	8¾	0	17	4	1	3	10	0	13	2	0	18	1
1790	1	2	9	2	5	6¾	0	17	2	1	3	7	0	14	3	0	19	6¾
91	1	3	0	2	6	0¾	0	18	5	1	5	3	0	13	0	0	17	10¼
92	1	1	8	2	3	4¾	1	0	0	1	7	5½	0	13	11	0	19	1¼
93	1	3	3	2	6	6¾	0	18	10	1	5	10¼	0	15	1	1	0	8½
94	1	3	11	2	7	10¾	1	2	2	1	10	5¼	0	14	10	1	0	4½
95	2	4	4	4	8	9¾	1	3	10	1	12	8¾	0	19	5	1	6	8
96	1	5	10	2	11	9	1	2	8	1	11	1½	0	14	11	1	0	5¾
97	1	3	0	2	6	0¾	0	17	9	1	4	4½	0	13	0	0	17	10¼
98	1	2	8	2	5	4¾	0	18	6	1	5	5	0	14	0	0	19	2¾
99	2	0	9	4	1	7½	1	11	11	2	3	10	1	8	7	1	19	3
1800	3	3	1	6	6	4½	2	6	11	3	4	6	1	15	8	2	8	11¾
1	1	15	7	3	11	3¼	1	6	1	1	15	9¾	0	17	4	1	3	9½
2	1	8	8	2	17	5	0	19	2	1	6	4	0	15	4	1	1	0½
3	1	5	11	2	11	11	0	17	0	1	3	4¼	0	16	11	1	3	2¾
4	2	2	4	4	4	9¾	1	11	6	2	3	3¼	0	19	8	1	7	0
5	1	13	4	3	6	9½	1	7	1	1	17	2¼	0	19	7	1	6	10½
6	1	11	2	3	2	5¼	1	9	6	2	0	6¼	1	2	4	1	10	8
7	1	13	5	3	6	11¼	1	12	9	2	4	11¾	1	6	11	1	16	11
8	2	5	11	4	11	11¾	1	10	6	2	1	10¾	1	5	4	1	14	9½
9	2	2	0	4	4	1¾	1	10	7	2	2	0	1	3	2	1	11	9¾
1810	2	0	6	4	1	1½	1	10	1	2	1	3¾	1	1	0	1	8	10
11	2	9	3	4	18	8	1	17	3	2	11	2	1	4	4	1	13	5
12	3	3	8	6	7	6½	2	2	6	2	18	4	1	17	0	2	10	9¾

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Years.	WHEAT.						BARLEY.						OATS.					
	Per Linlithgow Boll.			Per Imperial Quarter.			Per Linlithgow Boll.			Per Imperial Quarter.			Per Linlithgow Boll.			Per Imperial Quarter.		
	L.	s.	D.	L.	s.	D.	L.	s.	D.	L.	s.	D.	L.	s.	D.	L.	s.	D.
1813	1	16	10	3	13	9½	1	17	0	2	10	9¾	1	2	0	1	10	2½
14	1	11	10	3	3	9¼	1	5	0	1	14	4	0	19	11	1	7	4¼
15	1	5	9	2	11	7	0	19	4	1	6	6½	0	16	4	1	2	5
16	2	3	4	4	6	9¾	1	18	0	2	12	2¼	1	9	4	2	0	3¼
17	2	0	5	4	0	11½	1	12	5	2	4	6¼	1	6	3	1	16	0½
18	1	18	8	3	17	5½	2	1	5	2	16	10½	1	5	8	1	15	3
19	1	11	6	3	3	1¼	1	3	3	1	11	11¼	0	17	10	1	4	5¾
1820	1	10	8	3	1	5¼	1	1	0	1	8	10	0	16	9	1	3	0
21	1	10	2	3	0	5¼	1	1	0	1	8	10	0	17	2	1	3	7
22	1	0	7¾	2	1	4¼	0	19	9	1	7	1½	0	14	6	0	19	11
23	1	7	11	2	15	11	1	5	0	1	14	4	0	19	10	1	7	2¾
24	1	11	7	3	3	3¼	1	9	2	2	0	0¾	0	18	9	1	5	9
25	1	12	5	3	4	11¼	1	10	9	2	2	2¾	1	0	9	1	8	6
26	1	9	6	2	19	1	1	8	4¾	1	19	0	1	7	0	1	17	1½
27	1	4	5	2	8	11	1	3	1½	1	11	9	0	17	9	1	4	4¼
28	1	15	2¾	3	10	6	1	8	6¼	1	19	2¼	0	19	2	1	6	4
29	1	7	5¼	2	14	11¾	1	4	4	1	13	4¾	0	16	9	1	3	0

[It may be observed, that the prices shewn in the above table, although the medium prices of the county of Haddington, are considerably higher than the average fiars prices of Scotland, both on account of the superior quality of the grain of the district, and on account of a practice peculiar to the county of Haddington, of adding 2½ per cent. to the rates, as determined by the juries. The reason of this addition is, that about four-fifths of the grain sold in the county by the fiars, is sold with six months credit. If this allowance be deducted from the above table, it will be nearly an average with the highest fiars of the other counties of Scotland.]

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REPORT ON THE DISEASE IN TURNIPS CALLED FINGERS AND TOES.

[The disease in turnips generally known by the name of "Fingers and Toes," being of common occurrence in some of the principal agricultural districts in Scotland, the Highland Society, in 1828, offered an Honorary Premium for the best practical Essay or Report, founded on the personal knowledge of the author, and pointing out a probable preventive for the disease. There were accordingly submitted to the Society, two Reports, to which premiums were awarded, and of which abstracts are here given, together with a communication, the substance of which is also printed. It is obvious that the investigation of a disease, in vegetables as well as animals, ought to precede its curative treatment, but on this point it is to be regretted that the disease in question has not been perfectly described either with reference to its general nature and appearances, or with respect to its varieties or modifications. The same disease appears to bear the names of Fingers and Toes, Anbury or Ambury, and Canker, in different districts; and the remedies that have been proposed for it are as diversified as its symptoms. The incipient state of the disease is described as consisting of small knobs or tubercles, which are attributed to the puncture of insects, and in which eggs or larvæ are usually found. It is to this state that the name Anbury seems to have been more peculiarly applied. In the more developed state of the disease, the tap-root has been destroyed, and excrescences or subsidiary roots, resembling digitations, have spread out in different parts. The bulb becomes altered in its structure and qualities, and finally putrefies. The origin of the disease is almost generally attributed to insects.

In the opinion of one of the gentlemen whose reports are here given, the disease is caused by unfermented dung, and

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in that of another, by an excess of moisture in the manure, whether dung or not; while the third reporter, without speaking expressly of the cause, states the circumstances connected with its appearance and diffusion, and proposes fallowing as an effectual remedy. It may be observed, however, that in the principal districts of Scotland, where this disease most prevails, it has not yet yielded to any of the numerous remedies proposed; and the following papers are merely given as detailing the opinions of the writers upon a subject on which it is desirable to collect as much information as possible.]

I. REPORT ON THE DISEASE IN TURNIPS CALLED FINGERS AND TOES. *By the Rev. JAMES FARQUHARSON, of Alford Parish, Aberdeenshire, F. R. S.*

In the year 1818, the reporter had a field of six Scotch acres of excellent turnip soil, of uniform quality, dressed and sown with turnips, before the 20th of June, of which about four and a-half acres were manured with horse and cow dung, fermented within moderate limits, according to the practice of the district in which he resides. This part was sown with Scotch yellow turnips, and produced a healthy and very abundant crop. The other part, containing one and a-half acres, was manured with dung managed in quite a different manner. During the preceding winter, a parcel of sheep had been fed with turnip and straw, confined often through the day, and always at night, in a large shed. They had their turnips sometimes in the field and sometimes in the shed; and had always abundance of oat straw in the shed for provender, and bear-straw for litter. The manure made by the sheep, in this manner, was allowed to accumulate under their feet, trampled into a very compact state, and kept dry on the top by the application of additional litter, when necessary.

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The larger proportion of it thus consisted of straw wetted by the urine. The sheep were sold off in the middle of April, and the manure remained untouched till the middle of June, when it was carted out and applied, by double drilling, to the last-mentioned part of the turnip field. At this period, it was found to have undergone little or no fermentation. The straw in it was quite fresh and tough, and it could be removed by the workmen only in thin layers taken from the top, or by means of cutting it with the hay-knife.

The crop of turnips, consisting partly of Scotch yellow, and partly of white globes, in the part of the field to which this unfermented manure was applied, was very seriously injured by the disease called Fingers and Toes. In the early stages, indeed, the growth was rapid and vigorous, and the land being rich and largely manured, the tops attained a large size; but the roots, instead of forming bulbs in the usual way, were found to be split into numerous scariose and diseased radicles of very irregular and grotesque forms, and generally tinged with a dirty blue colour. A large part of the circumference of each radicle generally wanted the natural skin, and many of them wanted it altogether, appearing cancerous and rotten over the whole surface. These diseased roots were mostly rejected by the cattle, which ate up only the tops of the larger proportion of the plants, so that, on the whole, the crop proved of little value.

An incident occurred in the management of this part of the field, which shewed to what cause the disease was to be ascribed. Two cart-loads of well fermented cow-dung had been purchased of a neighbouring crofter, and applied in one end of ten of the drills. The crop here was very healthy and abundant, and the bulbs attained a very large size.

Since 1818, the writer has had no considerable parcel of sheep, a few only being constantly fed by him for family use. They are always cotted at night, and littered both in summer and winter. It has several times happened that the dung has been directly carried from the cot to the turnip field; and

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the result has uniformly been, that the turnips grown after it, when so applied in an unfermented state, have been more or less diseased with fingers and toes.

The facts above detailed might have left it doubtful whether the disease was owing to some peculiar quality in the dung of the sheep, as distinguished from that of horses and black cattle; but in the year 1826, the reporter carried on some operations, which have thrown additional light on the subject. Having that year, owing to the improvement of a piece of ground formerly uncultivated, a larger division for turnips than usual, and the supply of manure being exhausted, when about two acres of land still remained unsown, he resolved to sow these two acres in successive patches, as a fresh supply of manure could be obtained from the horses and other cattle. He was led to this procedure in the hope that, although the turnips, being sown much later than usual, could therefore only be expected to furnish a very inferior produce, they would yet be found of considerable value, in the unusual scarcity of fodder from the general crop, which the extreme dryness of that season already threatened. He had at the same time resources for speedily increasing the supply of manure. A quantity of old straw-thatch was liberally thrown as litter to the cattle, which were confined in a court, for the purpose of trampling it into manure. At the same time, the turf cut from a large open drain recently made in a piece of swampy ground, was dried, collected, and burnt into ashes, in large heaps. By these means a supply of manure for the two acres was procured, and applied, as it was got ready, to about each third part of it successively, on the 1st, 12th, and 20th of July.

The first part, sown on the 1st July, got a mixture of the dung-court manure and the turf-ashes; the second, sown on the 12th, was manured exclusively from the dung-court; and the third, sown on the 20th, got a mixture of dung and ashes like the first.

The crop on the first division proved a very good one,

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giving more weight of turnips from an equal proportion of ground, than any of the earlier sown crops of the season. That on the third also was close and healthy, but was checked by the frost before it had attained much weight. The crop on the second division, which got only the unfermented dung-court manure, was extensively diseased with fingers and toes, and scarcely of any value.

Again, in the year 1828, the writer had a small remainder of his turnip field manured with unfermented materials, procured in haste, by throwing a large quantity of litter to be trampled down by the cattle, and the crop which followed was partially diseased by fingers and toes.

From the whole of these facts, it appears a legitimate conclusion that unfermented dung is the cause of the disease of fingers and toes in the turnip crop.

In confirmation of the correctness of this conclusion, it may be stated, that, in the district of Alford, where turnips are cultivated on a large scale, the disease in question is almost entirely unknown, occurring in such trifling patches that the intelligent and industrious cultivators are generally ignorant of its existence. This is to be ascribed to the manner in which the dung of the bestial, forming, with the exception of lime, almost the only manure ever applied to the turnip crops, is managed in dung-courts and dunghils. The cattle being universally housed and tied up in stalls during the winter months, the dung produced in that season is made up in heaps, which, not being trampled down, speedily undergo a considerable degree of fermentation. Great care is, however, taken to prevent this fermentation from rising to any injurious excess, by occasionally applying to the heaps a covering of earth, which moderates it by the pressure and the exclusion of air. The heaps put up before the middle of March are generally made four or five feet deep; those at a later period only about three feet. They are not trampled, but laid on with the dung-fork, and covered, soon after being finished, with five or six inches of earth. The dung produced in the

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summer months is generally trampled down by the store-cattle, which at that season are, through the night, shut unbound into the dung-courts. But then this dung is always carried, during the beginning of winter, and made up into heaps in the field, where it is to be applied to the turnips in the succeeding June. In these heaps it, too, undergoes some fermentation; so that the whole of the dung, by the time it is applied to the land, is reduced to a dark-coloured, almost homogeneous mass, the straw mixed with it being quite rotten, and breaking with the slightest touch.

Regarding the manner in which the unfermented manure produces its effects, so injurious to the turnip plant; whether by the corrosive action of any peculiar acid, or by furnishing a nidus for any fungus which attacks the plant, or otherwise, the writer can say nothing with certainty; but this is fortunately of less practical utility, as the means of prevention are obvious.

It appears from the operations of 1826, above described, that turf-ashes applied with unfermented dung, are a complete preventive. The quantity of ashes, however, employed in that case, was very large, amounting to ten or twelve cubic yards per acre; and, as the writer, for want of experience, cannot determine whether a less quantity might have served the purpose, this may be a preventive which cannot be very generally procured in sufficient quantity. The general available remedy will therefore be, to have the dung put up in loose untrampled heaps, that it may undergo a sufficient degree of fermentation before it is applied. In the application of this remedy, however, great caution will be necessary to prevent waste by over-fermentation. The dung from the horses should be placed in alternate thin layers with that from the black-cattle, which will prevent the excess of fermentation to which the former is peculiarly liable; and when the heat of the mingled mass approaches to that which is painful to the feeling, it ought to be prevented from getting higher by a close covering of trampled earth over the whole heap.

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Should it ever be desirable to hasten the fermentation, from the near approach of the turnip sowing, this may be effectually accomplished by sprinkling a small quantity of powdered lime shells on each of the alternate layers, not exceeding 10 or 12 bushels of shells to every 20 loads of the heap, but the action produced by this means is so rapid, that it ought not to be employed, unless where the whole heap is to be applied to the land within four or five days afterwards.

II.—REPORT ON THE DISEASE IN TURNIPS CALLED FINGERS AND TOES. *By Mr JOHN ABBAY, Kirby Hall, Yorkshire.*

THE disease in question has been, to me, for many years, an unknown loss, as hardly any thing can injure a turnip crop to so great an extent. The place where I reside is in the very centre of the county of York, twelve miles north-west of the city of that name. The soil is good turnip land. The disease first made its appearance here about twenty-eight years ago, in small patches, in different parts of the fields affected. Wherever it took place, the same field would, the next rotation, have ten times the quantity affected; and, if it was sown a third time witn turnips, perhaps the whole field would be good for nothing.

When I entered upon the farm where I yet live, more than thirty years ago, I was under the necessity of stubbing up some old fences and planting new ones. At first, after the sand-banks on which the old fences stood were levelled, the turnips grew most luxuriantly; but, after a second and third sowing, the turnips on these stripes of land all became affected by the disease, and died off. After one or two turnip fallows, by crossing these stripes of land where the old hedges stood, with the plough, the parts affected became broader than could have been imagined; for so far as the plough carried any of the

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earth from the stripes, so far the turnips were good for nothing; and we have now full proof that a small portion of the earth affected will spread the complaint, as far as it is carried, into the adjoining soil.

About the time mentioned (1801), when the disease first shewed itself here, an act of Parliament was obtained for the enclosure of open fields and pastures in the township of Little Ouseburn, and part of the parish in which I reside. These open fields had been sown with turnips for more than twenty years before the enclosure took place, and, for the most part, had been eaten off by sheep, and never showed the least tendency to the disease. The soil is a good sandy loam, and of the first quality for turnips. The rotation of crops has been nearly the same for fifty years, viz. turnips, barley, red clover for mowing off, or sheep seeds, and wheat.

In these open fields, there were headlands of grass and stripes of the same, which had been left as divisions and boundaries. All these pieces of grass, when ploughed, became infected with the disease; and it was remarked, that the turnips adjoining the said headlands were on the one side good, on the other bad, which arose from the circumstance of the ploughman sticking the plough into the earth of the headlands, when the adjoining field, so far as any of the affected earth was carried into it, produced diseased turnips. The whole of the open pastures and commons in the said township, after they had been ploughed from eight to twelve years, became utterly unfit for turnips, the disease occupying their whole surface. The part, which had previously been open fields and old tillage, was never more than partially affected; only, the general opinion is, that it is far more difficult to procure a crop of turnips now than it was formerly.

I have been so long accustomed to the malady, that I can see when the turnips will be affected. Before the plants are a month old, and when nearly fit for being hoed, the canker will be seen begun at the bottom of the tap-root. In a short

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time it eats through the root, and cuts off the fibres below. When the plant is left in this enfeebled state, it exerts itself for life, by throwing out side fibres above the cankered part; and then, according to the richness of the land, the turnip shews more or less top, but never a well formed bulb. If the land is poor, the plants die off; but I have had them continue vigorous in their top through the month of July, while the root was running into all shapes like potatoes.

The remedy which I have to propose is merely an *open fallow*, instead of turnips. I can safely say, that I have never yet known it to fail in effecting a complete cure. The discovery was made by accident. Having fallowed a field which was to be sown with weld, I found, that when it came round for turnips, the crop was quite free of the disease; and having limed the field when fallow, I presumed the lime had preserved the turnips. In consequence of this, I afterwards limed part of a field with Knottingley lime, at the rate of 256 bushels per statute acre, when the whole crop died off, after the most hopeful appearance. The next time this infected field came for turnips, I made a fallow instead of turnips; and since then, the field has been twice under that crop, without exhibiting any appearances of the disease. After many trials on the whole of my farm, I am now confident of success; and my neighbours, to whom I communicated the result of my trials, have made fallows with the same benefit.

Where the land is only slightly infected, a crop of potatoes will answer in place of a fallow; and now that I have got the disease so much under, I intend to grow potatoes every third fallow, to prevent the evil being renewed.

Bone manure affords no relief from the disease; and different kinds of lime have been tried without success.

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III.—REPORT ON THE DISEASE IN TURNIPS CALLED FINGERS AND TOES. *By Mr M. BIRNIE, Hyde-Park, near Aberdeen.*

In a recent publication, containing a series of experiments in agriculture with a great variety of manures, I stated that the disease in question is produced in its worst form by very wet manure. In fact, up to the present season (the summer of 1829), I had, on every occasion, found, that on land which had received manure of the above description, the crop suffered from the disease. The experiments of this season were made expressly for the purpose of ascertaining still more decidedly how far my former conclusion was correct.

As I had a quantity of ash-pit manure, very wet, and made in the usual manner in a large pit, from the same substances which, when applied in a wet state, I had hitherto found constantly to produce the disease, I had a large portion of it thrown out of the pit some days previous to its being put into the drills. As it lay high, it had lost much of its moisture by the time it was wanted. A portion of wet manure was reserved to be put into some adjoining drills. The first quantity manured ten drills, the last two drills. The rest of the field was manured with bones.

When inspected on the second day of October, the field exhibited the following results: The ten drills were more free of the disease than I have ever before seen turnips treated with the same kind of manure applied very wet. They were not, however, entirely free. In the two drills to which the wet manure had been applied, every root of the number pulled up was infected. No appearance of the disease was seen in the rest of the field which had been manured with bones. In fact, I have never seen a turnip so affected in land that had received this manure.

I shall now state the cases in which I have found the dis-

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ease to prevail, and those in which I have not observed it. I have invariably found the disease after ash-pit manure, by which are meant coal-ashes, with every other refuse that comes from a house, deposited in a moist or wet situation, and applied to the land wet; also after newly made, and consequently very moist, perhaps I should say rich dung, from cattle and swine. I have never seen the disease after the application of ash-manure which had been deposited in a dry place, and put upon the land with but little moisture. I have never seen it in land manured with the dung of the above mentioned animals, well rotted, or even nearly so, and kept in a dry place until laid upon the land. Nor have I ever seen it after any kind of mixed manure, which had been previously mixed up, and had taken some degree of heat before it had been applied.

The above statements are derived from a close investigation of the subject during nine years in which I have been making experiments on manures, and recording their results. Although other circumstances may occasionally have an influence in producing the disease, still, I think, I am warranted in ascribing it generally to an excess of moisture in the manure, by avoiding which, we may be pretty sure of raising a healthy crop.

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REPORTS OF EXPERIMENTS ON SALVING SHEEP ON THE FARM OF CLOSS. *By Mr* JOHN GRAHAM, *Newbigging.*

I. *Report of Sheep smeared in* 1824.

THE number of sheep smeared this year was as follows:

244 sheep smeared with rosin, butter, and palm and fish oils, the wool of which, when clipped, weighed -	41 stones.
136 do. smeared with tar, butter, and palm-oil, the wool of which weighed - - -	26
28 do. white or unlaid, of which the wool weighed	4

In those smeared with rosin, butter, and palm and fish oils, the proportion and expense of materials for each 40 sheep were as follows:

7 lb. rosin, at 7s. 6d. per cwt., -	L. 0	1	$1\frac{2}{6}$
17 do. butter, at 10s. per 24 lb. - -	0	7	1
16 do. palm-oil, at 6s. 6d. per 24 do.	0	4	4
2 chopins fish-oil, at 2s. 6d. per gallon,	0	1	0
Labour laying on the salve at 1d. each,	0	3	4
The expense of the above for each sheep is 5d.	L. 0	16	$10\frac{2}{6}$

In those smeared with tar, butter, and palm-oil, the expense and proportion of materials for each 50 sheep were as follows:

5 quarts of tar, at 1s. per quart, -	L. 0	5	0
18 lb. butter, at 10s. per 24 lb. -	0	7	6
18 do. palm-oil, at 6s. 6d. per 24 do. -	0	4	$10\frac{2}{6}$
Expense of laying on, at 1d. each, -	0	4	2
	L. 1	1	$6\frac{2}{6}$

I sold the above wool in August 1825, as follows:

Wool smeared with rosin, &c. at 24s. per 24 lb.

Ditto with tar, butter, &c. at 21s. per 24 do.

Ditto white or unlaid, at 24s. per 24 do.

The wool smeared with rosin, &c. left of return from each sheep 4s. $0\frac{3}{4}$d.

Ditto smeared with tar, &c. left of return from each sheep 4s.

Ditto white or unlaid, left from each 3s. 5d.

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I paid particular attention to the health and thriving of all the above different lots of sheep; and those smeared with rosin, &c. appeared to thrive and continue in condition much the same as those smeared with tar, butter, &c. But those which were white or unlaid, were inferior in condition to the others at the time of clipping, and the cover of wool was not so good on them.

There was good demand for all the wool in the country this year, and it was chiefly bought up by the wool-staplers from England; and as there had been very little trial made in salving in any other way than with tar, butter and palm-oil, wool smeared in this way could be much more readily sold than either white wool or that which was smeared with rosin, butter, &c., which were only at that time made trial of. There was some complaint, that too much rosin had been used in the salve; and that the wool did not manufacture so well on that account; but, from the attention which I had paid to the thriving of the sheep from the time they were smeared, and to the growth and quality of the wool, I was convinced that the salve might be improved, in such a way as to be good for the growth and quality of the wool, and health of the sheep, and might supersede the use of tar, which has reduced the price of wool so much of late years; and I have in this year, 1829, smeared my sheep in the farm of Closs, with a salve, as in next report, which in my opinion will answer every good purpose.

II. *Report of Sheep smeared in* 1829.

The number of sheep smeared this year was as follows:—

Cheviot ewes, . .	274
Leicester ewes and tups, .	41
Blackfaced gimmers, .	118
Blackfaced hogs, . .	120
	553

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There were used for smearing the above sheep the following articles, viz.

123 lb. timber rosin, at 7s. 6d. per cwt.	L.0	8	2¾			
186 do. butter, at 8s. per 24lbs.	3	2	0			
186 do. hogs' lard, at 5s. per 14 do.	3	6	5			
10½ Scots pints gallipoli oil, at 4s. 6d. per gallon, being five gallons and one chopin, ...	1	3	7½			
	L.8	0	3¼			
Add expense of labour laying on at 1d. each,	2	6	1			
				10	6	4¼

The expense of smearing each sheep is 4¼d.

The way in which I have made up the different articles for each 55 sheep is as follows, viz.

18 lb. butter.
18 do. hogs' lard.
12 do. rosin.
2 Scots pints gallipoli oil.

The butter and lard are heated in one pot, and the rosin in another; and when both are fairly melted, they are poured into one tub, and well mixed. Two pints of the gallipoli oil are then added, the whole again well mixed, and then allowed to stand some days till it is fairly thickened and becomes a salve, after which it is ready for laying on.

From the experiments which I have made, I find that a larger proportion of the hogs' lard would still be an improvement on the salve, as it can be better applied on the sheep, and is one of the finest and most nourishing greases for the health of the sheep and growth of the wool. The salve, when applied on the sheep, very quickly destroys vermin, with which they are frequently annoyed, and is good for preventing scab or itch. The quantity of rosin I have used in making up the salve, is such only as to make the grease adhere to the skin, and to make the latter moist. The gallipoli oil is that oil which is used by manufacturers, and is

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excellent for washing or cleaning all kinds of wool or cloth; and when the wool, before being manufactured, is scoured, the gallipoli oil causes the other ingredients that have been used to wash out of the wool, so that it can be made perfectly clean, and equally valuable with unlaid or white wool, as none of the ingredients that have been used injure the wool in the smallest degree for dyeing or taking colours of any kind.

I made several experiments of using lard, mixed with tar and butter, a number of years ago; and from every thing I could judge, I found it always better for the health of the sheep, and more nourishing for the growth and quality of the wool, than any other grease or oil I ever used for that purpose.

From the rates at which wool has been sold for the last two years, I find that wool smeared with the ingredients which I have used this year, will be worth at least one-third more than that smeared with grease and tar, and can be much more readily sold, as there has always been a demand for white wool, while wool smeared with grease and tar has now become nearly unsaleable.

NEWBIGGING,
28th Nov. 1829.

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DESCRIPTION OF A SLEDGE ADAPTED FOR HILLY GROUND.

By Mr J. Cook, Civil Engineer, Yetholm.

Having been for several years past engaged in irrigating a considerable quantity of meadow-land in the Cheviot district, I was surprised at the difficulties which were experienced in bringing down peats, hay, and fern from the higher lands. In some places these articles were brought down upon the backs of horses, and in others on very clumsy sledges. In the latter case, the sledge was apt to run upon the horse, at the risk of laming him, or to take a lateral direction, and upset. The labour requisite for drawing these sledges up the hill again, is also very great; and in some places I have found that they could not be used at all. It appeared to me that these difficulties might be overcome by making a sledge very light in itself, and attaching a break or convoy to it. A sledge of this description has accordingly been made, and I am happy to find that it answers the purpose in a manner extremely satisfactory, as it brings a load of hay nearly equal in quantity to any long cart, with perfect ease and safety, down a hill, at any angle at which a horse can pass without a load, and, from its extreme lightness, is very easily drawn up again. Many respectable persons have witnessed its operation, and are fully satisfied as to its efficacy, it having been made, in their presence, to pass over various slopes, along which it would be impossible to convey the articles by the ordinary means. When it is reflected, that in many parts of Britain, where the declivities are such as to prevent the use of carts, the only modes of conveyance are by means of sledges, or by placing the articles directly on the backs of horses or men, it may not be unwarrantable in me to hope that the adoption of this improved sledge may be productive of considerable benefit. Its construction is very simple, and will easily be understood, by inspecting the accompanying plan.

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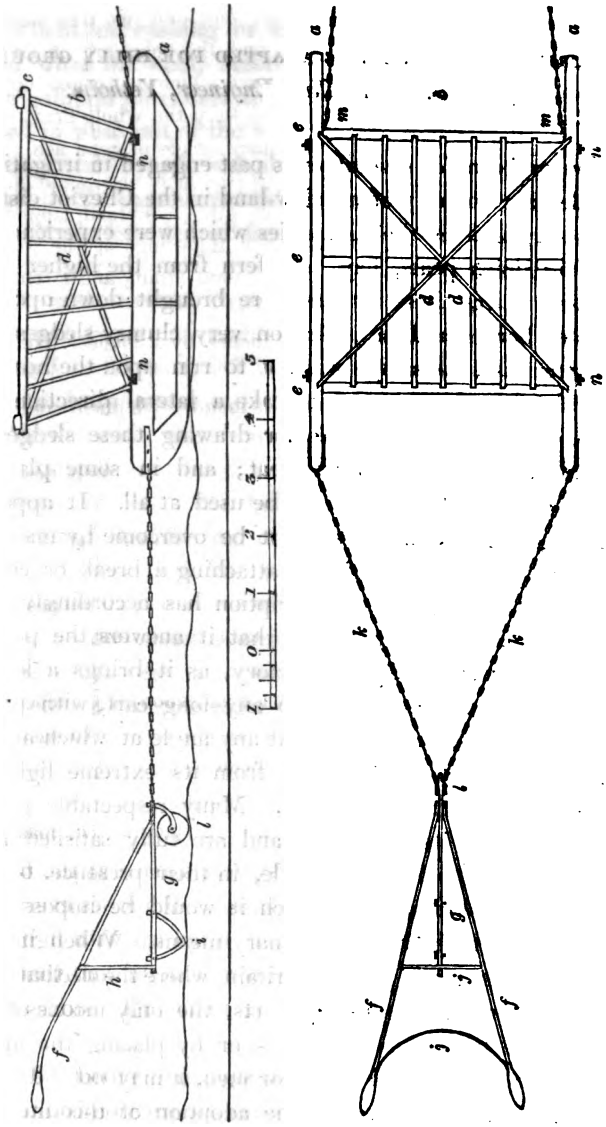

a. The soles are made of good elm or ash, $2\frac{1}{2}$ inches broad at the bottom, and 2 inches at the upper side, where the rungs or railings are morticed into them, and from 12 to 15 inches

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deep; the vacant space is cut out, and two tree-nails are driven up to strengthen it, and the soles are shoed with plate-iron $2\frac{1}{2}$ inches by $\frac{1}{8}$th inch, which is turned up, and lapped over each of the ends, to keep the whole firm.

b. The rungs or rails, $\frac{3}{4}$ths inch square, made of good ash.

c. The horizontal rail, 2 inches by $1\frac{3}{4}$ths inch, also made of ash.

d. Angular straps made of hoop-iron, $\frac{7}{8}$ths inch broad, lapped over the ends, and rivetted to each of the rungs at the joinings. This effectually supports the lateral strain, and strengthens the rungs.

e. The cods, or cross-stays, $3\frac{1}{2}$ inches by 2 inches, fixed by a double tenon to the soles.

f. The stilts, made of bar-iron, 1 inch by $\frac{1}{4}$th inch, and 5 feet long.

g. The bar, made of bar-iron, $1\frac{1}{4}$th inch by $\frac{5}{8}$th inch, and 3 feet 4 inches long.

h. Two vertical supports, 1 inch by $\frac{1}{4}$th inch, and 1 foot 8 inches long.

i. Friction coulter, $1\frac{1}{4}$th inch by $\frac{5}{8}$ths inch, and 10 inches wide.

j. Cross bars between the stilts, $\frac{1}{2}$ inch, round iron.

k. Chains, 7 feet long.

l. Wheel, 8 inches diameter, made of wood, $1\frac{1}{2}$ inches thick, hooped with iron, and fixed in an iron swivel, to answer any lateral motion which it may encounter.

m. Iron loops, to which the horse is yoked.

n. Iron crooks, to pass the ropes over in tying on the load.

The body of this sledge is $4\frac{1}{2}$ feet square at the bottom, $5\frac{1}{2}$ feet at the top, giving it a scale of 6 inches every way. When used for leading hay, it is fitted up with light overings. The weight of the sledge is 8 stones; and that of the break or convoy $3\frac{1}{2}$ stones, making in all $11\frac{1}{2}$ stones. The cost is L. 3, 10s.

The operation is simple, and easily understood. The person following with the break presses the friction-coulter more or less into the ground, as may be required, or relieves it, and lets it pass on the wheel, when not required. The friction-coulter may have more or less hold, by making its angle more acute or obtuse, as may be found necessary.

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ON RAISING THE SEEDS OF NATURAL GRASSES.

[In the year 1827, the Highland Society, with the view of encouraging the cultivation of indigenous grasses, offered a premium for a Report of successful experiments in raising, in Scotland, for sale, the seeds of some of the more important species. It was required, that the ground devoted to the purpose, in one season, should not be less than one acre; and that the experiment should be made on not fewer than three of the six grasses specified. It was also recommended, that the seed should be saved from crops separately sown in drill, and kept clean by hoeings, from all mixtures of other grasses and weeds. For the following report, which was received in 1828, the premium was adjudged to the authors.]

REPORT OF AN EXPERIMENT IN RAISING THE SEEDS OF NATURAL GRASSES. *By Messrs* PETER LAWSON *and* SON, *Seedsmen to the Highland Society of Scotland.*

WITH the view of competing for the Highland Society's premium for saving the seeds of natural grasses in Scotland, we hired, in the spring of 1827, from two farmers in the neighbourhood of Roslin, about one and three-fourth Scotch acres of ground, in order to make the experiment, at the rate of twelve guineas an acre, for the two seasons necessary for that purpose.

On the 11th June 1827 we had the following seeds sown separately in drill, and afterwards kept clean by hoeings:

10 lb. Anthoxanthum odoratum,	L. 1	15	0
2 bushels Alopecurus pratensis,	1	4	0
8 lb. Poa tirvialis,	0	12	0
Carry forward,	L. 3	11	0

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Brought forward,	L. 3	11	0			
16 lb. Cynosurus cristatus,	1	4	0			
1½ bushels Festuca duriuscula,	0	18	0			
2 bushels Dactylis glomerata,	0	14	0			
				L.76	7	0
The rent,	L.20	19	0			
And the other charges connected with the experiment,	6	1	2			
				27	0	2
Making altogether,				L.32	7	2

On the 12th July 1828, we received the first part of the produce, viz.

88 lb. clean seed Anthoxanthum odoratum, which at the then current price will bring	L. 11	0	0	
And, on the 8th August, we received the remainder, viz.				
10 bushels Alopecurus pratensis, @ 10/	5	0	0	
70 lb. Poa trivialis, 1/3	4	7	8	
8 bushels Cynosurus cristatus, 25/	10	0	0	
11 bushels Festuca duriuscula, 12/	6	12	0	
11 bushels Dactylis glomerata, 7/	3	13	0	
Making in all,				40 16 6
Which leaves a profit to us upon the transaction of				L.7 9 4

And considering that the quantity produced by Dactylis glomerata and Alopecurus pratensis, is much less than it ought to have been, owing either to the wet season at the time of harvesting, or some little inattention as to the particular time of cutting down the grass, we have reason to be satisfied with the experiment, and propose repeating it on a much larger scale.

The samples of the seeds produced are superior to those

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which are collected in the ordinary way; in particular the Alopecurus pratensis, which weighs 5 lb. 6 oz. per bushel, whilst any of this seed which we have formerly had, did not in any case exceed 4 lb. 14 oz. per bushel.

The following are the observations of Mr Haig of Easter Bush, on whose ground part of the seeds were sown:

The acre of land at Easter Bush is what may be denominated loam upon clay, and had been prepared after oats by fallow and careful cleaning. The seeds were sown in drills 8 inches apart. During the first season after sowing, the ground was twice hoed with the Dutch hoe, and the weeds were carried off. The following season the grasses were found so clean that they required neither hoeing nor weeding; and during the winter the grasses looked so beautiful and green, that, had there been much frost, it was intended to put sheep on to eat them down; but there being so much open soft weather, no cattle were allowed to feed on them, except during one day,—and the reason for putting the sheep on for this day was, that, in the event of a fall of snow, the same might have injured the grasses, in consequence of the advanced state of their growth.

As the spring advanced, the several species presented the following appearances: 1*st*, The Cynosurus cristatus and Alopecurus pratensis appeared farthest advanced, and always looked superior to the other species; 2*dly*, The Poa trivialis and the Festuca duriuscula looked next in advance, and wore a good appearance; 3*dly*, The Anthoxanthum odoratum seemed much later in the spring, but assumed an improved appearance as the summer advanced, and was the very first cut. It was cut with the sickle on the 30th day of June, winned in the field, and thrashed with the flail. The whole of the other grasses were cut on the 3d day of July with the

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scythe; sheafed, stooked, and thrashed with the flail on the field, on the 31st day of July, and two following dry days.

The grasses which were sown on Mr Blaikie's ground, also in drills at the same distances, and upon ground of a small declivity towards the north-west, were sown about six weeks later than those on Easter Bush, and the soil towards the bottom of the drills is loam, inclining to moss, the top a thin clay. The grasses upon the bottom of the drills or mossy part were of a most luxuriant growth. Those upon the top or thin clay were inferior, and these grasses were cut upon the 7th and 9th days of July with the scythe, and appeared equally forward, when cut, with the other grasses. All the species appeared to thrive well upon the different soils on which they were sown, but most luxuriantly upon that part of the land inclining to loam and moss.

We may take this opportunity of mentioning, with reference to the benefit to be derived from sowing down grounds with a suitable mixture of the different natural grasses, that Mr Macleod of Cadboll, a gentleman devoted to agriculture, and who has had about a hundred acres at Invergordon Castle sown down for permanent pasture within these two years past, with mixtures suitable for the different fields, has given us leave to refer to him. His fields afford satisfactory evidence of the utility of the practice.

EDINBURGH,
Sept. 28. 1828.

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REPORT ON DAIRY MANAGEMENT. *Addressed to the Depute Secretary, by* NORMAN LOCKHART, *Esq. of Tarbrax.*

THE Highland Society has for many years given its attention to the encourgement of the dairy farms of Scotland; and though the different premiums which it has offered and awarded have not served to extract all the information on this branch of rural economy which the Society was aware the intelligence of many of the respectable classes of agriculturists could enable them to furnish, still it cannot be denied that it has served many valuable purposes; and, amongst others, that of drawing the attention of many well-informed individuals in the dairy districts of Scotland to the discussion of various topics connected with this interesting subject. It has even been the means of producing some valuable treatises, in which the most approved systems for the management of dairy farms have been discussed at large. In particular, a gentleman situated in the heart of a district long famed for its dairy husbandry, Mr Aiton, Strathaven, has published a very valuable manual for the direction of dairy farms, which contains much interesting matter, practically useful to every occupant of a farm of that description. Neither must I omit to mention the great pains taken by the late Mr Harley to produce a work worthy of the subject of which it treated; and who, in his great dairy establishment at Glasgow, brought many important points to the test of critical experiment, the results of which were of the greatest practical benefit to the occupiers of dairy farms, and to the managers of large dairies.

The Highland Society, taking all these circumstances into consideration, conceived that a handsome premium offered for the best report of the best managed dairy in the county of Lanark, consisting of not fewer than 10 cows, kept from 20th April 1829 to 29th April 1830, without any change

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taking place on the stock, would draw forth some important points of information on that subject.

In forwarding to you my report as convener of the committee of the Highland Society in the county of Lanark, for taking charge of that matter, I regret that it must be more meagre in detail than I could have wished, and the results not altogether so satisfactory as I anticipated they should have proved. Notwithstanding a considerable expense incurred in printing and circulating the notices long before the period fixed on for commencing operations, only three persons presented themselves as intending competitors. One of them dropped off before making any attempt at all; another found the attention required as to management of milk, &c. so troublesome, that he too retired after a short trial. The only one who remained, and carried the Society's regulations into effect, as will appear from his report accompanying this letter, was Mr Archibald Brown, tenant in Tarbrax, a farm belonging to myself; and as it may be satisfactory to the Society that I should give a kind of analysis of his report, I shall do so as succinctly as possible, premising, that, as he received no assistance whatever from me, either in directing the mode in which he was to keep his accounts, or in any other way, so I shall state nothing of my own knowledge that is not contained in Mr Brown's own report.

Mr Brown states that he keeps 22 milch cows upon the farm of Tarbrax, which is a tract of remarkably grassy land in the eastern moors of Carnwath—that the cows are in general of the Ayrshire breed—that they were fed in the house upon tares during the months of August and September, and were out at nights from 9th June to 1st September, and in the day time during winter when the weather permitted—and that during winter they were fed upon meadow hay and straw, without turnips.

The average value of the pasture Mr Brown states at L. 2 per acre. It was generally seven years old, and composed very

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much of good natural grasses, part of it light dry soil, part of it clay, with an occasional intermixture of pieces of improved moss, the herbage on which is of a very nutritive quality.

All the utensils used in the dairy, &c. are wooden. The milk-house is fitted up with stone benches, and is 19½ by 15½ feet. The cheese-loft is immediately above, and is 21 by 15½ feet.

It was one important object with the Society to ascertain the difference in the quantity and quality of the produce of a given number of cows, when the milk of each cow was manufactured separately, or when the aggregate quantity of produce from the same cows was churned together. The Society stipulated that this should be tried with at least ten cows, once during the course of the year's experiment. Mr Brown having twelve cows that went in a field of good old grass, worth L. 3 an acre, set apart the whole for the purpose of the experiment, and he has given the return from each under different letters of the alphabet. Each of the twelve cows was tried for one week.

The milk of the twelve cows, taken together, amounted during the week of actual experiment to 600 pints, and the produce in butter was 84 pounds, being 1 pound of butter for every 7 pints of milk.

When the milk of these same 12 cows was kept and churned separately, the result was as follows:—The quantity of milk was 594 pints, and butter only 70 pounds, being 1 pound of butter to 8½ pints of milk. This is a result for which I confess I was not prepared; for every one knowing any thing of dairy management is well aware, that, from various reasons, the produce of cows churned separately ought to exceed their produce when churned aggregately; and the important object the Society had in view, was to ascertain the probable proportion by which the one exceeded the other, and the relative additional expense thereby incurred. Mr Brown

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himself was at first surprised at the result being so different from what he had anticipated; but it appears to me that he has accounted for it in a sufficiently satisfactory manner. He states in his report, that as his milk dishes were calculated for the scale of twenty-two cows, when the milk from twelve came to be put *separately* into the different coolers, it was so much divided, that the smallness of the quantity prevented the cream separating from the milk, for instead of standing perhaps three inches deep in the coolers, it did not stand above one; and, as a proof of the correctness of his reasoning, he states, that the cheese made from the milk kept separately was of a much richer quality than the other, and had more curd, the quality of butter in both cases being equally good. So that it would appear, that, in order to attain a satisfactory result in this point, a great many additional milk vessels would be required; nay, to carry on such a system for a continuance, even an additional milk-house would be indispensable. Mr Brown is also of opinion, that an additional servant might be required for the details of this separation of the produce of each cow; so that, taken altogether, I doubt if the results would by any means warrant or compensate for the heavy expense which would be occasioned in a large dairy.

He thinks, however, that, as an occasional trial, in order to ascertain the relative good qualities of the different descriptions of cows a farmer may have in his byre, the experiment might with advantage be made from time to time; and he himself states, that he has derived so much insight by this very experiment being in a manner forced upon him, with regard to the value of his different breeds of cows, that he means to adopt the plan of such a trial every year for his own information. And, if this statement from a plain country farmer shall induce others to follow the plan, I think that one of the main objects contemplated by the Highland Society, in instituting this comparative trial, will have been com-

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pletely realized. Mr Brown states as one proof of the value of such a comparative trial, that one of his cows marked A, a handsome cow of the Ayrshire breed, and which calved about the 15th of May, gave, during the separate trial, 42 pints of milk during the week, producing only 3½ pounds of butter, or 1 pound of butter from 12 pints of milk. Another cow, marked L, the produce of a Berwickshire cow by a Teeswater bull, and which calved a month before the other, produced, during the week of trial, 64 pints of milk, and 8½ pounds of butter, being 1 pound of butter from every 7½ pints of milk, or thereby. A, was three years old, had then her first calf, and weighed about 27 stone. L is five years old, nearly white, and weighed 26 stone. In this case Mr Brown prefers breeding from A, because she is handsome, and the stock "*will take the market*," unless the future stock of L shall prove of a more attractive description than her offspring has hitherto done.

In glancing the eye over the detailed account kept by Brown, which accompanies his report, it also appears, that some of the cows, while they did not give above 6 pints more milk, yet produced nearly double the quantity of butter. Thus, while A gave 42 pints, and 3½ pounds of butter, F and K, though they only gave 1 pint more each, viz. 43 pints, yet they each gave 2 pounds more butter; and though G only gave 44 pints milk, the produce in butter was 7 pounds, being about 1 pound of butter from 6½ pints of milk. Mr Brown also mentions what is well known to all dairy farmers, that it required nearly double the time to churn the milk of some of the cows, that was required for others; and hence the evident advantage of ascertaining such points in this important branch of rural economy. Such discoveries as these are well worth all the trouble necessary, as they point out in so incontrovertible a manner the description of stock a farmer ought to breed from, according to the objects in view.

It would appear from Mr Brown's Dairy Report, that, after

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the thirty-third week, the produce from the cows was so very limited, as not to be worth the trouble of extracting, nor the expense of keeping up their productiveness, by giving them more nutritive food, and that during the first five weeks, from 20th April 1829, the calves got the whole of the milk. The whey and extra butter-milk were used in the family.

The district in which the farm of Tarbrax is situated has long been famous for the quality of its dairy produce. The immediate adjoining farms have repeatedly carried off the prizes for the best imitation of English cheese, even Stilton, when the competition was open to other counties; and Mr Brown states, with regard to his system of management, that the farm produced butter of the best quality, commanding the highest market-price. He states the mode of treating the milk to be the depositing it, whenever milked, into the coolers, standing about three inches deep. One milking stands twenty-four hours, the other thirty-six, when the cream is taken off, and deposited into a clean cream tub. A cheese is made from the milk. The cream is churned twice a-week, at a temperature not exceeding 52 degrees, the butter is carefully gathered from the churn, and well washed; a pound of salt, with a very small portion of saltpetre, is put to each stone weight of 14 pounds. The butter-kitts are carefully seasoned, well rubbed with salt, and the butter well packed, and stored up in a cool dry house for market. The system of making cheese is so well known, and so successfully practised in this district, that Brown seems to consider it as susceptible of little or no improvement; and, as the Highland Society have had so many opportunities of judging of it, and given substantial proofs of their approbation, it is unnecessary for me to add any thing on that score. I may add, that Brown retained the same cows during the whole year, no change having become requisite, either owing to death or any severe accidents.

I am aware that it is incumbent on me to apologize for

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having drawn out my statement to such length; but as there was only one competitor, and that one my own tenant, I thought it proper to go into the whole detail, which he himself has done in his report, and which the regulations of the Society required him to do; and I sincerely hope that some of the spirited dairy farmers in other districts will give their attention to similar experiments; keeping in view, however, that it will be adviseable, in all such cases, to have their milk vessels better suited to the extent of the intended experiment, than was the case in the situation which I have imperfectly endeavoured to bring under the notice of the Society in the preceding report.

EDINBURGH, 1*st June* 1830.

DESCRIPTION OF A SELF-ACTING GATE. *By Mr* ROBERT RUSSELL, *Mill-Wright, Denny Loanhead.*

THIS gate is so contrived as to be opened and shut by the carriages themselves, which, as they advance or recede from it, act by their wheels on an apparatus under the road, and situated at 40 or 50 feet on each side of the gate. This apparatus consists of two tracks for the wheels of the carriage, similar to those of a weighing-machine, and level with the road at their extremities, but rising a few inches above it in the centre. As the carriage advances on the tracks, its weight depresses them, turns a lever concealed under ground, and, by means of a long rod connecting this lever with the gate, throws it open. In this situation it remains till the carriage arrives on the tracks on the other side, when, acting in a manner quite similar, it shuts the gate.

The whole operation will be understood from the drawing at Fig. 1, Plate IV. the sections of the tracks and levers at Figs. 2 and 3, and the plan of the rails and pinions on the gate at Fig. 4. In Fig. 2, A B is the track, jointed at *a* and *b*, to

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SELF-ACTING GATE.

Fig. 1.

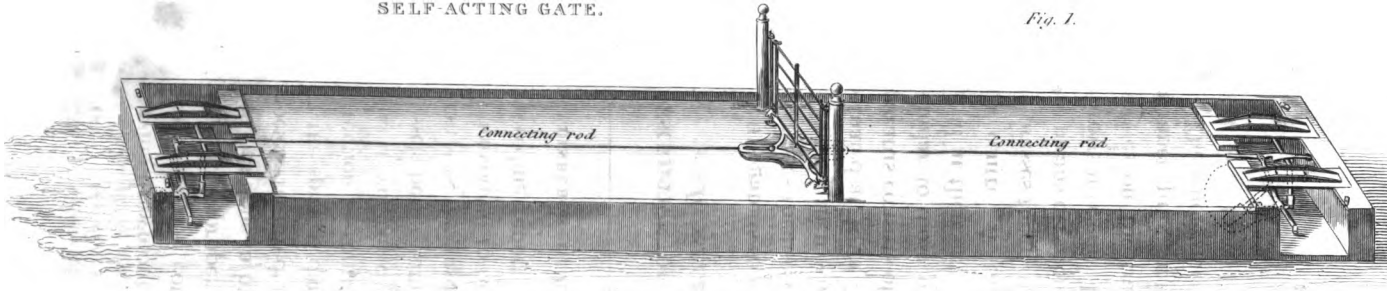
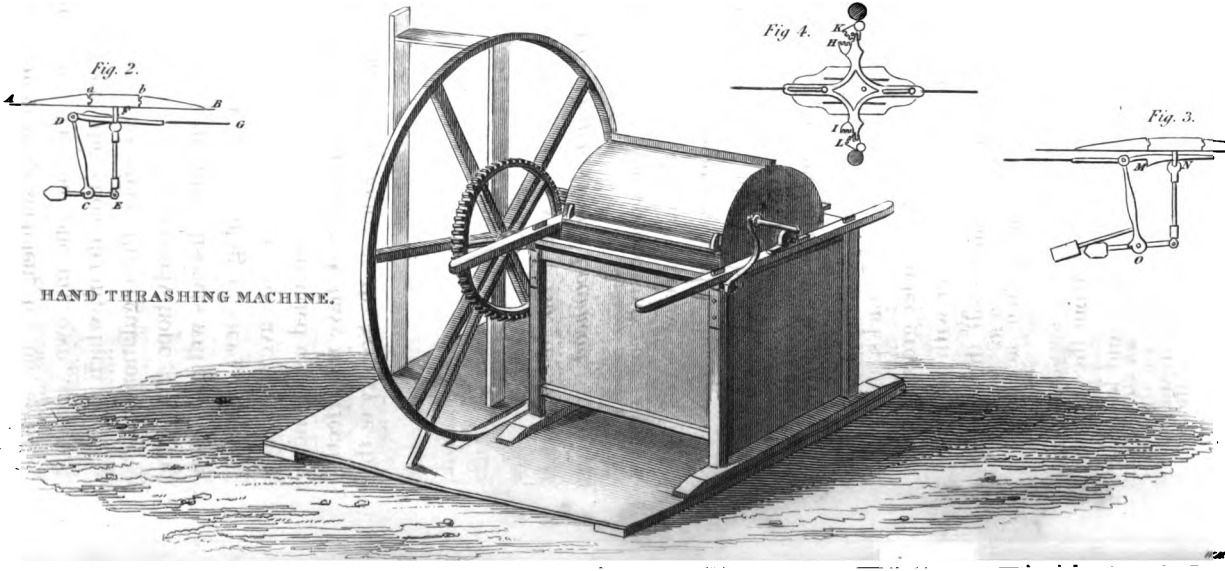


Fig. 2.

Fig 4.

Fig. 3.

HAND THRASHING MACHINE.



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enable it to sink level; F E, the upright rod to which it is attached, jointed at E, and connected with a bent lever E C D, turning on the centre C, and, as E descends, pushing forward the extremity D, and with it the connecting rod to which it is attached, and thus pushing forward the rails H I, Fig. 4, to which it is attached; these cut on the pinions K L, and with them turn the levers of the gate. This operation brings at the same time the catch M, Fig. 3, of the other tracks over the lever N, where it remains fast, and prevents the gate from shutting; for which purpose the lever has a motion, to a certain extent, round the joint O. When the carriage again arrives at the tracks Fig. 3, the lever N sinking unlocks the catch, and, by means of a centre weight, the gate shuts of itself. When the gate is shut, it is kept shut by the machinery; but, by means of a spring-catch, it may be opened or shut by the hand, without acting on the machinery at all. The inventor states, that these gates, with their machinery, &c. could be constructed at an expense of about L. 25.

The situations in which gates of this construction may be supposed to be convenient or useful, are in approaches to mansion-houses, or in roads leading through gentlemen's parks, where it is frequently convenient or necessary to place one or more gates. In this case a gate, with the machinery described, would obviate the inconvenience of interruption to carriages in passing. It is obvious, however, that care must be taken that the elevated tracks on which the wheels are to press shall be so placed, as not to be missed by the wheels on approaching the gate, otherwise inconvenience, or even accidents, might occur. While the tracks also are made of the proper size, care must be taken that this be not so great as that the larger animals might so press upon them as to give motion to the machinery.

Various attempts have been made to construct gates which should open on the approach of carriages, but for the most

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part the machinery has been too complicated, and the force required to move it too considerable. That which has been here described, although apparently somewhat complicated, seems to be easily put in motion, and as much calculated to answer the purposes intended as can be expected.

DESCRIPTION OF A HAND-THRASHING MACHINE. *Communicated by the Very Reverend Principal* BAIRD.

THIS machine is represented in the drawing, Plate IV. It consists merely of a chain with its beaters, &c., and having a toothed pinion on its axis, worked by a toothed wheel, to the axis of which a handle is attached, and also a large fly-wheel to regulate the motion. The pinion has six teeth, and the wheel about fifty; so that, by making twenty revolutions of the handle per minute, the chain with the beaters might easily be impelled at the rate of 200 per minute. Such a machine, on small farms, might be expected, from its simplicity and cheapness, to be of essential utility.

It must be observed, however, of all thrashing-machines driven by the hand, that the labour required to move them is very considerable. In general, it has been found that the labourers employed in driving the machine must be relieved at intervals. This seems to be the reason why these machines have not been so generally adopted on the smallest class of farms as might at first view be supposed. In order to diminish the labour required, the machine should in all cases be confined to the operation of merely thrashing out the grain by the action of the revolving drum or roller, and the subsequent separation of the chaff and grain must be effected by manual labour, precisely as when the flail is employed. All attempts to add to the machinery the parts necessary to perform these operations may be expected to fail, from the great increase of power required to keep the machinery in motion.

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REPORT ON THE PRESENT STATE OF THE OUTER HEBRIDES, COMMONLY KNOWN BY THE NAME OF THE LONG ISLAND.

By Mr WILLIAM MACGILLIVRAY, *A. M.*

THE range of islands which forms the subject of the following Report, however interesting to the naturalist, has seldom been visited by persons capable of investigating its treasures. In a political point of view, it seems to have been almost entirely overlooked. Placed in the hands of a few proprietors, of whom none are permanent residents, containing a population not generally characterized by knowledge or enterprise, possessing few internal resources, and having little communication with the more advanced parts of the country, it remains in a condition, as to agriculture, commerce, and arts, much inferior to that in which it might have been, had more anxiety been felt for the improvement of its inhabitants, and had the activity and energy of the latter been stimulated by the diffusion of knowledge among them, and by their emancipation from the thraldom of ancient prejudices. There we find the last remains of feudalism struggling with the elements of a system more suited to the progressive improvement of society; a wretched mode of agriculture beginning to give way to a better; the disrupted bond by which the chief was united to his tribe, separating the apparent interests of each; a population increasing beyond the means of subsistence; the long-descended natives of the soil beginning to be supplanted by strangers; and the neglected remnants of the Celtic race reduced to extreme poverty, or urged by destitution to remove to a far distant land, where, whatever may become of the moral and intellectual wants, the physical demands of life may be supplied.

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Geographical Character.—Along the western shores of the northern and middle divisions of Scotland, are seen scattered at irregular intervals, like so many dissevered fragments of the mainland, the groups of islands to which the name of Inner Hebrides is applied. Beyond these, and separated from them by a channel varying in breadth from forty to fifteen miles, are extended the Outer Hebrides. These islands form a nearly rectilinear range stretching from south-west to north-east, along a space of about 140 miles, bounded toward the east by the Minsh, to the west and north by the Atlantic Ocean, and at the southern extremity running into the Irish Sea or North Channel. The range consists of five principal masses, and a multitude of smaller islands and rocks. The larger islands are, Barray, at the southern extremity of the range; South Uist; Benbecula; North Uist; and Harris and Lewis, forming together the northernmost and largest island. Harris is separated from North Uist by a sound varying in breadth from eight to twelve miles, and Barray stands in the same relation to South Uist, although its sound is of less extent; but the Uists are separated from the intervening island of Benbecula, only by narrow channels, in great part laid dry at low-water, and therefore named Fords. Each of these larger masses has in its train numerous islets, and rocks, which occur scattered along the coasts, and chiefly in the sounds or their vicinity. In the sound of Harris, the number of these islets is so great, that when viewed from the neighbouring heights, especially at low-water, when a multitude of reefs and shoals appear, they suggest the idea of a country partially submersed, the summits of the hills and rocks alone protruding in the form of islands. From this circumstance, the apparent continuity of the range, as viewed from most of the hills, its nearly rectilinear direction, and the comparative facility of communication between its different parts, the name of Long Island has been collectively applied to the series, and by this name it is exclusively designated by the natives, as well as by mariners.

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The whole range may be said generally to be mountainous, although low slopes and irregular plains exist in some parts of it. In Lewis, there are three lofty groups, the Park mountains, on the eastern side, the Uig mountains, on the western, a lower range, between them, running from the Harris mountains, and a low, irregular group in the northern part. Harris is in all parts mountainous. A broken ridge, extending from the island of Scalpay, on the east coast, to the island of Scarp, on the west, in a direction transverse to the line of the range, forming an exception to the geological axiom that mountain chains generally run in the longest direction of islands, is the highest ground in the Outer Hebrides; and in its massy precipices, rugged peaks, and narrow transverse valleys, presents scenery, which, were it occasionally softened by verdure, and adorned with woods, could hardly be surpassed by any similar tract in Scotland. In North Uist there are two low ranges of hills, with long slopes intervening. Benbecula consists of a low hill, with irregular slopes. South Uist, flat in its northern and western parts, rises into an elongated group, in the midst of which shoots up the lofty mountain of Eachcla, surpassed only by Clisheim in Harris. Lastly, Barray, like the latter district, is entirely mountainous.

A considerable portion of Lewis, the greater part of North Uist and Benbecula, and much of South Uist, consists of low swampy ground, covered with peat, and intersected by lakes. The eastern side of the range is in general rocky, with peat soil, and a heathy vegetation while the western is more verdant, and in many parts covered with beautiful pastures, on a sandy soil. The eastern coasts are rugged, but in few places precipitous. They are indented by lochs and creeks, and abound in excellent harbours and anchorages, of which the more remarkable are the Loch and Harbour of Stornoway in Lewis; the harbours of Scalpay, East Loch Tarbert, Finsbay, Rodell and Hermitray, in Harris; Loch Maddy in North Uist; Loch Skiport, Lochunort, and Loch Boisdale, in South

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Uist; Ottirvore, Flodday Sound, and the harbour of Vatersay, in Barray. The western coasts, belted with shelving sands, present very few harbours, although in Lewis, Loch Rog, with its sinuosities and ramifications, furnishes several.

The number of lakes and pools in all the lower parts of these islands is astonishing. Several of these lakes, as Loch Langavat, in Lewis, a lake of the same name in Harris, and various lakes in the Uists, are of considerable dimensions; but none of them possess any of that sylvan beauty which is so eminently displayed by the lakes of the mainland, and their dark brown waters give a sullen and melancholy air to the surrounding scenery, in itself sufficiently desolate. Wherever there are mountains, there must be rills and torrents; but, in the Outer Hebrides few streams of any magnitude exist, and none deserving the name of rivers.

Geological Character.—The geological constitution of a country is of greater importance in reference to agriculture, commerce, and arts, than is commonly imagined. Upon it, in fact, depend entirely the forms of the surface, the quality and quantity of the debris, and in a great measure those of the diluvium and alluvium. Were the Outer Hebrides composed of the metalliferous limestone and coal measures, it may easily be imagined how different the condition of their inhabitants would be. They are entirely of primitive formation, with the exception of a small patch of conglomerate in the neighbourhood of Stornoway. The rock is generally gneiss, which exhibits numberless varieties. In many places the gneiss is granitic, shewing hardly any tendency to the laminar arrangement, and distinguishable from granite only by the more or less parallel seams of stratification. The simple minerals which enter into its constitution are quartz, felspar, mica, hornblende, garnet, and a few others of less importance. According to the individual predominance of these, beds of what might, if viewed separately, be considered as quartz-

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rock, mica-slate, hornblende-slate, and garnet-rock, frequently occur. The gneiss is frequently fissile in large plates or slabs, and the hornblende-slate might in some places be worked as roofing slate, were it considered expedient to do so. Very frequently it is so interspersed with sulphuret of iron, and so intersected by fissures, as to become extremely brittle. The rocks in the vicinity of Stornoway are of this kind, and the inhabitants have, in consequence, judged it expedient to import building stones from the mainland. In most parts, however, building stone of excellent quality is easily procured. Granite and syenite of various kinds are seen in masses. Large veins of the former traverse the gneiss, generally protruding above the surface. Trap veins are also not uncommon, and frequently form the beds of rivulets. Potstone, serpentine, asbestus and actynolite occur here and there, often in vast quantity. The felspar of the granite veins might be procured in abundance, for the manufacture of porcelain. No metallic ores have been discovered in sufficient quantity to be worked. Iron-pyrites, copper-pyrites, magnetic iron-ore and titanitic iron-ore, are the only kinds which I have observed. Limestone, the most important rock in an economical point of view, I have seen only in Harris; and there, so mixed with hornblende and sahlite as hardly to be worth burning.

Soil.—The gneiss of these islands has undergone little decomposition. There are no heaps of disintegrated stones, or long stripes of gravel and sand marking the course of mountain torrents. Where fragments have fallen from the precipices, they remain angular and undecomposed, and are partially crusted with lichens and mosses. The rock, whitened by the action of the weather, or scantily covered by vegetation, generally appears at the surface, amid irregular patches of peat soil, producing heath and carices. On the mountains, the peat soil has not commonly accumulated to a great depth, and

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either lies directly upon the rock, or upon a thin irregular layer of greenish clay mixed with fragments of stone. The whole eastern side of the range presents this rugged and sterile appearance; and in Harris, in particular, so great is the proportion of exposed rocky surface, that, when the sun shines upon the eastern declivities, they seem from the Minsh as if covered with snow. In the valleys there is no diluvium, and the matters which have accumulated there seem merely to have been washed down by the rains from the enclosing heights. In some parts of the west coast, however, as in Harris, in Uig, and especially in Barvas, there are considerable deposites of clay, mixed with angular fragments of rock. The inland glens and slopes are of the same nature as those of the eastern coast; but on them the peat has sometimes accumulated to a great depth. In Lewis there are extensive tracts of low, irregular slopes and plains, deeply covered by peat, swampy, and intersected by steep banks, bogs, and pools. Similar tracts occur in the Uists; and, to a less extent, in the other districts, excepting Barray, where the peat is more shallow than in the other islands. In general, when the peat soil does not lie directly upon the rock, there is a thin irregular layer of tough clay under it. This clay and the gneiss rocks being alike impermeable to water, the moors are extremely wet during the greater part of the year.

Along the western side of the range, the bottom of the sea appears to consist chiefly of sand. This sand, which is almost entirely composed of broken shells, reduced to various degrees of tenuity, extends into the sounds, forms the great fords between the Uists and Benbecula, is spread out in numerous shallow bays and creeks, which are left dry at low-water, and extends to a variable distance above water-mark, sometimes forming banks of considerable height, but more frequently expanding into irregular plains. This sand has greatly modified the aspect of the western coasts, which are comparatively, low and shelving, with rocky promontories

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and cliffs here and there interspersed. Sometimes it is loose to a great extent, and in blowy weather resembles an expanse of recent snow, drifted by the winds. Carried to a great distance by the frequent and boisterous gales which occur, it has mingled with the peat and clayey soils of the declivities, and produced a soil more favourable to vegetation.

Changes on the Coast.—Along the western coasts of these islands there are numerous indications of their having extended farther into the Atlantic at some former period. In the first place, there are deposites of clay, shewing abrupt faces, on the tops of maritime cliffs of small elevation. Secondly, there are very extensive sands, dry at low-water, and then uniting to the mainlands tracts which at high-water are converted into low sandy islands. Such are the islands of Borreray, Valay, Heisker, and others, on the west coast of North Uist. Thirdly, numerous points of low land have been carried off by the currents, and peninsulas have been converted into islands, within the memory of the present inhabitants. Lastly, there are, in the islands of Valay and Pabbay, beds of peat, containing stumps of trees, in their original position, exposed at low tides; and others evidently sloping from the land into the sea, where, of course, they could not have been originally formed. On the other hand, the land has gained in some places by the formation of tracts of sand, stretching out into the sea, at the meeting of two currents on the lee of an island.

Seas.—The sea presents little very peculiar, excepting the strong currents in the sounds and along the headlands. Its waters are very clear, even after storms, there being little muddy ground, and no large rivers. The west coast is not frequented by shipping, being out of the lines of navigation to America, Greenland, or the Baltic, and, moreover, extremely dangerous. Wrecks, however, are not very unfrequent

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on this coast; and great quantities of timber, chiefly pine and mahogany, sometimes cover the shore, with, occasionally, casks of sugar, bags of coffee, and hogsheads of rum. From all these good things, however, the natives have hitherto, in most places, been withheld by the factors and their subsidiaries, insomuch that I have seen the shreds of putrid blubber, torn from a stranded grampus, sold to the people who had secured it, while another tenant was obliged to pay for a whale which he had towed in from a considerable distance. Several species of seeds from the West Indies, and the *Spirula Peronii* and *Ianthina communis*, which are natives of tropical seas, are frequently found on the beaches. These may be supposed to be carried across the Atlantic by the Gulf Stream. Pumice, slags, and surturbrand, are also occasionally met with on the shores.

Vegetation.—Along the western side of the range, the vegetation consists, first, of such plants as we usually find in other parts of Scotland along the sea-coast, although in very many places the vegetation of the moors descends to the water's edge; secondly, of the ordinary heath plants; and, lastly, sometimes in the glens, but chiefly in stripes of clayey soil stretching along the shores, of most of the pasture plants of other districts. The low moors and bogs are abundantly covered by Scirpi, Carices, Junci, and Eriophora, intermixed with ling and the two common heaths, together with numerous other plants. The numberless pools and lakes are in general plentifully stocked with Carices, Equiseta, Scirpi, and other aquatic species, among which are distinguished *Menyanthes trifoliata*, *Nymphæa alba*, *Lobelia Dortmanna*, and *Potamogeton natans*. The white water-lily, in particular, during the summer months presents a beautiful appearance, often covering the water to a great extent with its broad leaves and splendid flowers. The yellow water-lily occurs in some of the lakes of North Uist, but I have not seen it else

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where. In summer, the brown and dull-green herbage of the moors is further enlivened by the purple flowers of *Pedicularis palustris*, *Orchis maculata*, *Pinguicula vulgaris* and *lusitanica*, *Anagallis tenella*, and other species; and in autumn by the white down of the Eriophora, which to the native bard has furnished the subject of so many similies and analogies. The higher mountains of Lewis, South Uist, and especially Harris, afford most of the alpine plants of the Grampians and other mainland groups. Several of these plants even occur on hills of very small elevation. The slopes of the western coast are generally characterized by more verdure, and a comparatively luxuriant vegetation. In many parts the difference is very striking; but even here, to the native of a more favoured clime, the appearance of the hills is far from pleasing, the glare of the light-grey rocks almost predominating over the green tints scattered in irregular patches.

Speaking vaguely, one might pronounce these islands entirely destitute of wood. In fact, an incurious person might travel from one end of them to the other without seeing a single shrub. But in the ruts of streams, on lacustrine islets, occasionally along the shores of lakes, and in the clefts of rocks, there may be found stunted specimens of several species of trees. The common birch, the broad-leaved elm, the mountain-ash, the hazel, and the aspen, are those commonly met with. Willows of a few species are abundant along some of the rills, but seldom attain a height of three feet. *Rubus corylifolius*, *Rosa tomentosa*, *Lonicera Periclymenum*, and *Hedera Helix*, are the only shrubs worth mentioning.

The vegetation of the west coast is more important. So decidedly superior has it been rendered by the sand, so abundant there, that the population is much more numerous than along the east coast. Near the tide-mark we find the usual maritime plants common in sandy soil: *Cakile maritima*, *Atriplex maritima* and *laciniata*, *Salsola Kali*, &c. In the loose sand there is frequently abundance of *Arundo arenaria*,

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Triticum junceum, and *Carex arenaria*. The sandy plains and slopes are covered by a diversified vegetation, which in summer presents a beautiful display of flowers of every tint: the yellow blossoms of *Galium verum*, *Lotus corniculatus*, *Anthyllis vulneraria*, *Trifolium procumbens* and *minus*, *Ranunculus bulbosus*, and *Lathyrus pratensis*, mingled with the red and purple flowers of *Erythræa latifolia*, *Bartsia Odontites*, *Gentiana campestris*, *Trifolium pratense*, and *Vicia Cracca*; the blue of *Campanula rotundifolia*, *Polygala vulgaris*, and *Scabiosa succisa*; and the white of *Trifolium repens*, *Achillea Millefolium*, *Euphrasia officinalis*, and *Bellis perennis*. The Gramineæ which occur in these pastures are: *Lolium perenne*, *Festuca ovina* and *duriuscula*, *Aira cristata*, *Agrostis alba* and *vulgaris*, *Cynosurus cristatus*, *Poa pratensis*, and *Holcus lanatus*. A person unacquainted with these pastures might be astonished to find how many cattle a small island, like that of Pabbay, containing a large proportion of them, is capable of maintaining. Still more nutritive is the pasturage of many of the islets and rocks, whose vegetation consists almost entirely of *Festuca ovina*, *Statice Armeria*, *Plantago maritima* and *Coronopus*. In autumn the sandy pastures lose their beauty, and in winter and spring, what in summer presented an abundant and vigorous vegetation, is frequently a dreary waste of drifting sand.

Upon the whole, there is nothing very peculiar in the vegetation of the Outer Hebrides, if we look to the species only. Some plants are common there which are rare in other districts, as *Orchis bifolia*, *Satyrium viride*, *Scilla verna*, *Raphanus maritimus*, *Pinguicula lusitanica*, *Osmunda regalis*, and *Asplenium marinum*; while others, common elsewhere, are not there to be seen, as *Veronica Chamædrys*, *Scabiosa arvensis*, *Galium cruciatum*, and many others. Their most striking character consists in the absence of wood as well as of the whin and broom. The latter plants, how-

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ever, I have nowhere seen on the west coast of Scotland, from Loch Fyne to Pollewe.

The marine vegetation is very luxuriant. On the sandy shoals which occur in the sounds, and along the western coasts, extensive fields of *Zostera marina* are exposed by the retiring tide. Large quantities of this plant are often cast ashore in winter, and are used as manure. The sunk rocks, and in general the lower parts of the rocky shores, are covered by a profusion of *Laminaria digitata*, with which the beaches are strewed after hard gales. *Fucus nodosus*, *F. vesiculosus*, *F. serratus*, *F. loreus*, *F. canaliculatus*, and other species, are abundant on all the rocky and stony shores; as are *Laminaria esculenta*, *Chordaria flagelliformis*, *Halymenia palmata*, *Ulva lactuca* and *umbilicalis*.

Climate.—The climate of the Outer Hebrides differs considerably from that of the mainland of Scotland. Marking the seasons by the changes produced upon the vegetation, I may say, that spring commences toward the end of March, summer about the end of May, autumn about the middle of August, and winter toward the end of October. The first blossoms of *Ranunculus Ficaria* and *Bellis perennis* seldom appear until about the 25th of March, while on the mainland they are frequently to be seen in the beginning of February; and the pasture grounds have not lost the grey and yellowish tints of their winter vegetation until the end of May, or sometimes the middle of June. The winters are generally mild as to temperature, snow seldom lying long on the ground, especially near the shores, and the lakes being hardly ever frozen. But heavy and continued rains, accompanied with westerly winds, and violent gales from the Atlantic, with showers of sleet and hail, and sometimes thunder, are frequent at this season. Upon the whole, however, the winters are less severe than on the mainland, and especially than on the east coast of Scotland. The commencement of spring is

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generally colder than the winter, and is always wet and boisterous. As it advances, dry easterly winds prevail, and cause much drifting of the sand and newly-turned soil. Summer is frequently ushered in with continued rains, and is extremely variable, as is the early part of autumn. When the summer is dry and hot, the grassy pastures are burnt up, and the crops, which are chiefly on sandy soil, are deficient. At all seasons heavy gales are occasionally experienced. In winter the huts are frequently unroofed by these gales, boats broken to pieces, and the sands blown to an immense distance. It is needless to say that the ocean during these tempests presents a magnificent spectacle, its huge billows dashing over the low rocks and islets, and ascending the precipitous shores, often to an astonishing height, the spray being carried far inland. Judging by the shaggy covering which black cattle and horses assume at this season, one might be apt to imagine the winters more severe than they really are; but this circumstance may depend upon other causes than the lowness of temperature. There is certainly a much greater difference between the pile of an English horse and a Shetland pony, than between the winter temperatures of their places of residence. Westerly and southerly winds are predominant, and generally bring rain. The rapidity with which iron becomes covered with rust is remarkable, and veneered articles of furniture are apt to warp and burst in the joinings.

Quadrupeds.—The native quadrupeds of the Outer Hebrides are few. The red deer was formerly very abundant in the large islands, and still occurs in considerable quantity, especially in Lewis and the northern part of Harris. The pine marten, *Mustela Martes*, is not uncommon, residing among the blocks and loose stones on the sides of the hills. The common shrew, *Sorex araneus*, occurs in the pasture-grounds, frequenting chiefly the banks of rills. The grey rat is abundant in most of the islands. As it swims with

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ease, it has settled in many remote islets and rocks, where it feeds principally upon limpets and crustacea. The domestic mouse is common. The hare has been naturalized in the northern part of Lewis, as well as in one of the Barray Islands. The rabbit also has been naturalized in Barray and Vatersay. It may seem strange that the common mole and the fox should not occur in any part of the range. The otter is of frequent occurrence, residing among blocks, in the fissures of rocks, and in the coves, along the coast, and preying on marine fishes, but seldom appearing in the interior. A considerable number of otters is annually killed for the sake of their skin. The common seal is very abundant in many parts, frequenting the sounds and bays, but more especially certain small islands situated at a great distance from the others. Of this kind are Hasker and Gasker, off the west coast. In autumn a boat goes annually to the latter island from Tarasay in Harris. If the people happen to surprise the seals on shore, which they frequently do, they make great havoc among them. Upwards of a hundred and twenty have been killed on some of these occasions.

Cetaceous Animals.—Many species of Mammifera occur in the ocean and sounds; but these, being less subject to observation, are comparatively little known. The porpoise, *Delphinus Phocæna*, is not uncommon, but is seldom captured. The grampus, *Delphinus Orca*, sometimes appears on the coast in droves of from fifty to several hundreds. On the appearance of one of these droves, the inhabitants assemble and pursue them in boats. The grampuses, in attempting to make their escape, yet suffer themselves to be driven in the direction chosen by their pursuers, and are commonly stranded on some sloping beach, when the people get among them, armed with harpoons, knives, and other lethal instruments. In this manner, large droves have often been secured. The length of the grampus is sometimes 30 feet or more, but indi-

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viduals of 10 or 12 feet only, occur in these herds. The quantity of oil which they yield is from one barrel to five or six; seldom, however, more than three. Excepting the Cetacea, which are probably numerous in these seas, and of which individuals are now and then cast ashore, in stormy weather, the Outer Hebrides thus possess few mammiferous animals.

Birds.—The case is different with respect to the class of birds, of which there are about a hundred species. Of these nine or ten are rapacious, five omnivorous, fourteen insectivorous, six granivorous, one zygodactylous, one hirundine, one columbine, and two gallinaceous. The Grallæ and Palmipedes outnumber all the other orders together. Of the former I have seen about twenty species, and of the latter there occur at least thirty-four; while, of the lobe-footed water birds, I have seen three, although a few more probably exist. Of the rapacious birds, the golden eagle, *Falco fulvus*, and the cinereous eagle, *Falco Albicilla*, are the most remarkable. These birds are common in all parts of the range, and one can hardly look about him at any time of the day, without seeing one or more soaring along the hill sides. They sometimes commit great havoc among young lambs; but the cinereous eagle has more the habits of a vulture than of a falcon. The raven is also extremely common. The numbers that congregate from all parts when a horse has been killed, or a grampus or other cetaceous animal has been stranded, are truly astonishing. The hooded crow is equally abundant. The starling, which inhabits rocks and caverns on the coast, is commonly seen attending the herds in large flocks, and in winter frequenting the corn-yards. Of the insectivorous birds, the more remarkable are the throstle, the wheat-ear, and the common titlark, which are very abundant. Of the granivorous, the common lark, the bunting, and the linnet are the most numerous. It is remarkable that the common sparrow occurs in no part of the range, excepting the Mainland of

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Barray, where it is to be seen about the ruins of Kilbar. The rock-pigeon, *Columba Livia*, the origin of our domestic races, is very common, especially on the west coast, breeding and resting in the maritime caves and fissures, along with the starling and shag, and in winter forming very large flocks. The red grouse and ptarmigan are very numerous, especially the first. Of the Grallæ, or Wading Birds, the oyster-catcher, the heron, the curlew, the whimbrel, the snipe, and the land-rail, are among the more remarkable. The lobe-footed water-birds are reduced to three, the coot, the eared grebe, and the dobchick. The Grallæ and Palmipedes, however, are the tribes that chiefly excite the astonishment of strangers, by their prodigious numbers. From the beginning of summer to the middle of autumn, the sands, bays, creeks, coves, and especially the headlands, and remote islets and rocks, swarm with the latter birds. Two species of tern, seven gulls, the feaser, the fulmar, the stormy petrel, ten or more species of geese and ducks, two mergansers, the cormorant, the common shag, and the crested shag, the gannet, the great northern diver, and the red-throated diver, the common guillemot, the black guillemot, the auk, and the puffin, are all to be seen, many of them in astonishing numbers.

In winter, the heaths and lower grounds seem almost deserted of birds. On the latter, however, large flocks of pigeons, plovers, and starlings, are occasionally seen. But the shores, at this season, are covered with plovers, sanderlings, purres, oyster-catchers, gulls, crows, and other birds. In spring, no addition has been made to the stock of permanent residents; but, at the commencement of summer, thousands of birds are seen on the waters, and the landrail and whimbrel are plentiful in the pasture grounds. The islets and rocks become covered with sea-birds of different species, which breed there, and the lakes upon the heaths are frequented by others, which find a secure retreat upon their islands. The islands, which are placed at a great distance from the others, such as Ronay,

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the Shiant Isles, the South Isles of Barray, Hasker, Gasker, and the Flannan Isles, are at this season transformed into so many roosts for the myriads of birds which retire thither to rear their young. The golden plover, the dunlin, the snipe, the greenshank, the sandpiper, and other species, breed upon the heaths; the merganser and the red-throated diver on the lacustrine islets. In autumn, the myriads of summer visitants retire to other climes, and a small accession is made to the resident species, by the arrival of the snow-bunting, fieldfare, redwing, woodcock, and a few other species. As the winter advances, vast flocks of geese and ducks make their appearance; and swans, often in great numbers, frequent a few of the lakes.

Some occasional benefit is derived by the inhabitants generally from the birds which frequent these islands; but, on the more sequestered rocks, the natives turn them to more account, living for weeks every year upon their eggs. This is more peculiarly the case with the inhabitants of St Kilda, who moreover pay a great part of their rent in feathers.

Reptiles.—There are very few reptiles. St Patrick's blessing has visited the Outer Hebrides, in part; for, although serpents are not rare there, the lizard, the frog, and the toad have been excluded. The only snake which I have seen is the slow-worm, *Anguis fragilis*, a perfectly harmless species; but the viper, *Coluber Berus*, is not uncommon in many places; and the natives have often described to me snakes of various colours, some of which may be distinct from the viper.

Fishes.—The sea swarms with fishes of numerous kinds. The most important are the ling, the cod, the tusk, the coal-fish, the dog-fish, the herring, and the haddock. The gurnet, *Trigla Gurnardus*, the skate, *Raja Batis*, the thornback, *Raja clavata*, the turbot, *Rhombus maximus*,

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the common flounder, *Pleuronectes Flesus*, the plaise, *Platessa vulgaris*, the conger-eel, *Muræna Conger*, the sand-eel, *Ammodytes Tobianus*, the lump-fish, *Cyclopterus Lumpus*, and many others are common. The dog-fish, *Squalus Spinax*, occurs off the west coast in prodigious shoals, and is more particularly fished by the people of Barvas, who dispose of the oil obtained from it in Stornoway. The basking shark, *Squalus maximus*, named Kerban by the Hebridians, is a very remarkable species. Its length is from 20 to 40 feet or more; its colour blackish above, light below. It appears in the sounds and along the coasts in the beginning of summer, in large droves, often remaining motionless at the surface for hours together, in calm weather. It is perfectly harmless, and is easily harpooned. Formerly its visits were more regular; and, in most of the hamlets on the east coast, harpoons and lines were kept for the purpose of capturing it. The only useful part is the liver, which yields from two to eight barrels of very clear oil. Prodigious shoals of sand-eels are often to be seen along the sandy shores, in which they burrow, and where they are procured at low water, by means of hooks similar to a common sickle, but with wider teeth. Toward the end of summer, and during the whole of autumn, the coasts are lined with myriads of the fry of the coal-fish, *Gadus carbonarius*, which are here named Cuddies, together with multitudes of the same fish in its second year, named then Sythe. In the third year, it is about a foot and a half in length, and, when full grown, becomes dry and coarse. The best cod is obtained at a distance from the coast, but the younger individuals frequent the vicinity of shoals and sunk rocks in the sounds and bays. The gurnet is very abundant; as is the haddock in some parts, while in others it is never seen. Skate of enormous size sometimes occur, and flounders of several species are abundant along the sandy shores. The herring is by no means plentiful in the Outer Hebrides. Along the eastern coasts, it sometimes occurs in the lochs and

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creeks in considerable abundance; but on the west coast seems to be rare. Loch Bog in Lewis was, many years ago, celebrated as the resort of very large herrings, which arrived there about Christmas and disappeared in a few weeks; they discontinued their visits for a long series of years, but have of late reappeared.

The lakes and rills are also plentifully supplied with fishes. The fresh-water species, however, are not numerous, although the individuals of which they are composed are extremely so. The salmon ascends all the streams of any size, and occurs particularly in that issuing from Lochlangavat in Lewis, in a stream near Keose in the same district, in that at the head of Loch Resort between Lewis and Harris, at Bunantru in the latter country, and in several places in the Uists. The sea-trout, *Salmo Trutta*, also ascends the rivulets, and at certain seasons occurs plentifully in some of the lakes. Every lake, and almost every pool, swarms with trouts of numberless varieties; among which, however, I have only seen two species, the common trout, *Salmo Fario*, and the char, *Salmo alpinus*, the latter rare. The rivulets also afford the former in abundance, as well as the par, *Salmo Salmulus*. The common eel and fresh-water lamprey, both held in detestation by the Hebridians, are the only other species which have occurred to me in fresh-water. Even the loche, minnow, and stickleback, so common in the rivers, pools, and ditches of the mainland, do not seem to exist in these islands.

Mollusca.—Of the classes Cirripeda, Conchifera, and Mollusca, which include all that is commonly called Shell-fish, I have observed about a hundred and twenty species. Of the first of these classes there are about ten, of which the most remarkable is the common bernacle, *Anatifa lævis*, which is frequently seen covering logs that have been drifted in from the Atlantic. Wood of this kind is also very often perforated by the *Teredo navalis*. The most common Conchifera are:

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Solen Ensis, *Mya truncata*, *Mya arenaria*, *Cardium edule*, *Mytilus edulis* and *incurvatus*, *Venus pullastra*, *virginea* and *Gallinula*, *Cytherea exoleta*, *Cyprina islandica*, *Mactra stultorum* and *solida*, *Tellina tenuis* and *solidula*, *Modiola barbata*, *Pecten maximus*, *Ostrea edulis* and *Anomia Ephippium*. The rare shells of this tribe which occur are *Anatina villosiuscula* and *Pecten niveus*, both first described by myself; *Lutraria compressa*, *Venerupis nucleus*, *Psammobia tellinella*, *Venus Casina*, *Cardium serratum* and *exiguum*, and *Pectunculus Glycymeris*. Many of these animals are extensively used as food. The common cockle, *Cardium edule*, is very abundant; and, on the sands of Barray, Uist, and Harris, is collected in prodigious quantities in summer, during the annual scarcity which then prevails. I have seen upwards of twenty horse-loads picked from the sand of North-town in Harris, by the inhabitants of two hamlets, in one day; and in his Statistical Account of Barray, Mr Macqueen says it has been computed that during two summers, peculiarly distressing on account of the great scarcity, not less than from 100 to 200 horse-loads were taken off the sands at the north end of that island, at low water, every day of the spring-tides, during the months of May, June, July, and August. It is eaten boiled, along with bread, and sometimes with milk; but the former of these articles is not always to be had. On the east coast, *Venus Pullastra* is similarly treated. *Mya truncata*, *Solen Ensis*, the common oyster, and the great clam, also furnish an occasional supply, although their distribution is not general. The latter is indisputably the finest shell-fish in Britain. In many of the rivulets, and especially in those of the Forest of Harris, there is abundance of the pearl mussel, *Unio margaritifera*. In the class of Mollusca, the species commonly used as food are *Patella vulgata*, *Turbo littoreus*, and *Purpura Lapillus*. Of the first of these prodigious quantities are gathered, as is well attested by the heaps of shells at the door of almost every hut. This species

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and *Buccinum undatum* are also used as bait for fish. The land shells are not numerous in species; *Helix aspersa*, *H. hortensis*, *H. cæspitum*, and *Bulimus acutus*, being all that I have seen. In the pools, *Lymnæa peregra* and *ovata* are sometimes found.

Crustacea.—Crustaceous animals are abundant along the rocky shores. The common lobster, in particular, occurs in great perfection, and has been regularly fished on the coast of Lewis to a small extent. On the shores the natives mark the holes and cavities to which this species betakes itself, and are in the habit of daily visiting them when the tides are low. The common crab, *Cancer Pagurus*, does not attain so large a size as on the east coast of Scotland, but is very abundant, as is *Cancer Mænas*. *Hyas araneus*, *Pagurus Bernhardus*, *Portunus puber*, *Talitrus Locusta* and *Gammarus Pulex*, are very common. The lobster, however, is the only species of this class that can be of much importance, and the time usually occupied in gathering crabs and limpets might be better employed in various ways.

Insects, &c.—Of the class of insects it is unnecessary to say much. The more common species are *Scarabæus stercorarius*, *Forficula auricularia*, *Musca vomitoria*, *carnaria*, *stercoraria* and *domestica*, *Tabanus bovinus*, *Culex pulicaris* and *pipiens*, *Papilio Napi* and *Rapæ*, *Libellula vulgata*, *Apis hortorum* and *muscorum*. The bug and cricket are unknown. The honey-bee, *Apis mellifica*, is nowhere to be seen, wild or domesticated; and it is doubtful whether it could be cultivated to advantage in these countries, the florescence of the sandy pasture being of short duration, and that of the heaths late and scanty. The nests of *Apis muscorum* are always very small. The only insects from which any considerable inconvenience is experienced are the *Tabanus bovinus*, which is very abundant in July and August, and the dread of which

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causes the cattle to rush into the pools and fords during hot weather; the *Blatta orientalis*, which has been naturalized in Stornoway; and the Culices, which, however, are hardly so tormenting as in wooded countries.

The other animated productions of nature which occur in these islands, being in general of little importance to man, I shall only mention a few of the more remarkable. *Lumbricus marinus* is extremely abundant in all the sands, and is employed as bait, although it is less esteemed for that purpose than the sand-eel. The common leech, *Hirudo medicinalis*, I have seen in Harris, where it is said to be not uncommon. *Gordius aquaticus* is frequent in pools and spongy ground, and is supposed by the natives to originate from the hair of cattle. Actiniæ, Echini, Asteriæ, Medusæ, and other tribes of the lower orders are abundant; but no species of these genera is employed as food, or for any other purpose, by man.

Scenery.—The general aspect or scenery of the Outer Hebrides is in many respects peculiar. Long ranges of bare, rugged, and rounded hills, irregular plains and slopes of wet moor, covered with heaths and carices, and numberless pools and lakes of dark-brown water, present no pleasing picture to the person who may have to traverse these islands in winter, or at any season during rainy weather. Dangerous sand-fords, channels swept by rapid and eddying currents, and full of sunk rocks and shoals, an eastern coast subject to sudden squalls from the lochs and glens, and a western almost continuously lined by a heavy surf, seem incompatible with the safety or comfort of such as may have to perform long or frequent journeys, as the tacksmen, some of the clergy, and especially the few medical men of the country, have to do. In winter, during boisterous weather, the scenery exhibits a mixture of the sublime and desolate, which is peculiarly apt to inspire melancholy, although the natives are by no means

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of a sombre cast of mind:—the vast Atlantic, covered with foam, rolling its long waves toward the coast, breaking furiously over the sunk rocks, and dashing upon the rocky shores and sandy beaches; huge masses of heavy clouds, sending down torrents of sleet and hail, drifting rapidly with the gale; eddying winds, raising the water of the fords and lakes in a conical form, unroofing the huts, and scattering the sands over the pasture-grounds; the sea-birds crouching upon the sands, or scattered over the fields; the black-backed gull, and others of the larger species, now and then shooting overhead with the rapidity of a meteor, or labouring hard to bear up against the blast; the huts of the inhabitants half covered with drifted sand, or surrounded by pools and mud; the cattle arranged in hollows and along the walls, with their tails to the wind, drenched and drooping, but unable to lie on the wet ground, or to go forth to procure a mouthful of withered herbage. Under circumstances so adverse, one might wonder that animal life could be sustained in these islands during winter. But a change soon comes over the scene:—the storm has passed away; there is a solemn stillness in the air; the roar of the still agitated ocean is heard on all sides; the sun sends his feeble rays through the thin grey haze; the temperature is mild; the wild animals are again scattered abroad, and the inhabitants come forth, with their horses, to remove to the fields the vast heaps of sea-weeds that have been cast upon the beaches.

In fine weather, the view from the summit of Clisheim, or any other high mountain in the range, is truly magnificent: the ocean glowing with the splendour of the western sun, and blending afar with the pale blue sky; the remote isles of St Kilda rising on the verge of the horizon, like volcanic mountains emerging from the deep; the long series of islands, seen in nearly its whole extent, with all the sinuosities of its shores, its sandy beaches, rocky promontories, fringed with foam, its mountains and crags, and its numberless lakes and channels;

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the thin streams of light grey vapour rising from the kelp-kilns; the broad channel of the Minsh, commencing in the German ocean, and losing itself southward among the far isles and capes; the long coast of the mainland of Scotland, presenting a barrier of lofty and serrated mountains, with the intervening islands of Skye, Rum and Mull; the precipitous capes, basaltic ranges, and conical peaks of the first of these islands; the currents in the Minsh, marked by broad streaks of shade, with the vessels thinly scattered over it; and perhaps the eagle sweeping along the mountain ridges, or soaring far up into the region of thin cirri.

In summer, the country, especially along the west coast, has assumed so much of verdure, interspersed with beautiful flowers of all kinds, that one wanders with delight among the pastures, as the throstle pours his mellow song from the hill-side, and the land-rail is heard in the sedgy meadows. At the earliest dawn, the plover and the snipe sound their shrill pipes, and the lark carols among the grass. At sunrise, long strings of the gannet, the cormorant, and other sea birds, are seen passing into the sounds, or skirting the shores. Toward ebb-time, bands of women and children betake themselves to the beaches to procure sand-eels, or are scattered among the rocks, collecting limpets and sea-weeds. The kelp-makers ply their laborious occupation. In short, all is quietness and beauty, until the birds are seen retiring to their caves, and man closes his eyes on the scene.

Inhabitants.—The inhabitants of the Outer Hebrides may be of Celtic or other origin. Philosophers, like Dr MacCulloch, who go by head-mark, tell us that all the fair-haired natives are Danes, and all the grim and swarthy ones Celts. Be this as it may, the natives are in general robust, of ordinary, or rather low, stature, hardy, patient under privation, active, and, when stimulated, capable of great exertion, but not habitually industrious, at least in an eminent degree.

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There is considerable diversity in the physical and moral characters of the inhabitants of the different islands. All agree in having an inveterate antipathy to the inhabitants of the next island. The natives of South Uist and Barray, being chiefly Catholics, are greatly disliked by the natives of the northern isles, who are Protestants. The people of Lewis, and more particularly those of the north-west coast, who are supposed to be of Norwegian origin, are more slovenly, less active, and less fluent in speech, than those of the other districts. The natives of the Long Island are acute observers of natural phenomena, skilful in interpreting indications of the weather, averse to changes of any kind, respectful to their superiors, kind to their relatives, hospitable to each other and to visitors, but rather hostile to strangers who settle among them. They are generally rather lively than grave, never morose, easily affected by occurrences, but under the influence of passion never brutal, and seldom violent, and in adversity hoping to the end. No true Hebridian ever committed suicide; nor, since the times of the *Creaghs*, when murder was meritorious, has any been guilty of murder. Husbands never beat their wives, and children never rebel against their parents, as in the civilized parts of the land. On the contrary, the most perfect domestic harmony prevails. Personal strength and activity are the qualities which excite esteem, and the want of them invariably produces contempt. For this reason, old age is not generally treated with becoming attention. This circumstance, however, is not peculiar to the people of the Outer Hebrides, but extends to other districts, and results from the general condition of the natives of these islands, more than from any peculiarity in their character. The death of an aged person is rightly considered as a matter of course; but the funerals of old and young are celebrated with a very unbecoming indulgence in convivial enjoyments. There are no beggars of the kind usually seen in more advanced districts. Many aged, or otherwise infirm and destitute persons,

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by the assistance of their relatives, and the articles of food and clothing collected during one or two annual tours through the parish, contrive to support themselves without other resources, there being no poor-rates or parish work-houses in these islands. Petty theft, sheep-stealing, and other indications of laxity of morals, are prevalent. Many superstitious ideas, now extirpated in other districts, still linger in the Outer Hebrides. Of this kind are the second sight, various modifications of witchcraft, apparitions, and the belief in certain beings, the offspring of an unbridled imagination. The religious instruction of the people does not seem to me to have been over-zealously administered; but there is among them a manifest desire to hear the "good tidings," which, however, injudiciously and obscurely imparted by ignorant and fanatical persons, have lately produced strange evolutions of character. The hereditary and habitual reverence of the Highlanders towards their superiors, here degenerates into abject servility; but of this circumstance advantage might be taken by the proprietors and factors for the improvement of the people, although I am not aware that such has, in many instances, been the case. Insinuating in their address, and addicted to flattery and scandal, the natives are at the same time grateful to their benefactors, and peaceably disposed toward each other. They are fluent in speech, and express their feelings with eloquence. A stranger might reasonably suppose the natives of the Outer Hebrides to be greatly deficient in ingenuity. Their minds, in fact, have never been directed toward improvement of any kind, and they continue the construction of their huts and implements as practised by their ancestors from time immemorial. This circumstance, however, instead of proving an actual want of invention, merely shows that, until improvements of various kinds have been in a manner forced upon the people, and until they perceive the advantage to be derived from them, they will continue to adhere to ancient customs. The prevailing language is the Gaelic, of which a reverend gentle-

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man of Lochcarron says, "it is strong, nervous and comprehensive: no language can do greater justice to the finest feelings of the human heart;" but of which one may, with equal justice, say, it is in its present state totally unfit for the diffusion of knowledge, and forms one of the greatest obstacles to the improvement of the people who have the misfortune to be unacquainted with the English, a language which, though less poetical, is much better suited to all the more important interests of society.

As may be supposed, very few instances of obesity occur in these islands. The climate, although wet and boisterous, is not decidedly unhealthy. Fevers, rheumatism, coughs, and pleurisies are rather common. The sibbens, a disease happily almost unknown in other parts in Scotland, are prevalent in some districts; and, in others, a spasmodic disease, frequently proving fatal, affects infants from the fifth to the eighth day after birth, on which account it is named "the disease of the fifth night." At most seasons, both men and women are much exposed to the inclemency of the weather, which, together with coarse and frequently scanty food, and early exposure to privations of all kinds, leaves them rather stunted and weather-beaten. Nevertheless, many individuals attain to an advanced age, although, generally, longevity is not common. Scrophula and phthisis are of rare occurrence. Hysteria is prevalent, as are various spasmodic diseases, together with erysipelatous inflammations, and œdematous swellings of the feet. Deformity and idiocy are not rare; but mania is seldom seen, it being generally dependent upon causes which operate more powerfully in an advanced state of civilization.

Habitations.—The first cares of the population of every country must necessarily be directed toward their physical wants; and the manner in which the inhabitants of these islands have supplied theirs comes now to be considered.

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There are only two classes of inhabitants, the tacksmen or principal farmers, and the small tenants or cottars. The houses of the former are in all respects greatly inferior to those of the same class in most parts of the mainland. Those of the latter are all constructed upon the same plan. The wall is about six feet high, composed of two facings of stone, without lime or clay, at the distance of about four feet from each other, and of earth, which occupies the interval. The covering is of barley straw, rarely of heath or other materials, supported by couples and spars of oak or birch, brought from the mainland or Inner Hebrides. The thatch is secured by ropes of heath laid across the roof, parallel to each other, a loop being formed between every two ropes, into which a large stone is thrust. The apartments are commonly three, and are separated by partitions made of wooden boards rudely fastened to a cross spar by ropes, or of straw ropes interwoven between pieces of wood. The first and largest apartment occupies nearly one half of the hut, and in it is the general entrance. The others occupy each about a fourth. The first apartment contains the lumber, agricultural implements, poultry, &c. and in winter the cattle. The second is that in which the family resides. The uppermost is the sleeping room and granary. There are no chimneys, nor even gables. The smoke fills the whole hut, and vents partly by a hole in the roof, partly by the door, and partly by orifices formed between the wall and roof, as substitutes for windows, and which in stormy weather are closed by a bundle of straw. The fire is placed in the middle of the floor. The soot accumulates on the roof, and in rainy weather is continually dropping. For the purpose of obtaining it for manure, the hut is unroofed in the beginning of May. The dung of the cattle, which has accumulated during winter and spring, and has been mixed with straw, ashes and other matters, is at the same period removed from the lower apartment. The furniture is of the rudest description. A pothook, with a swivel, dangles from the roof, covered with ropes of soot. A few rude chairs, some wooden

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cogs, a pot or two, a spinning wheel, distaffs and spindles, one or two chests, and some other articles, make up the catalogue.

In the outer Hebrides there is one small town, Stornoway, containing a population of upwards of 2000, and situated on the east coast of Lewis; but there are no villages properly so called. Having an excellent harbour, much frequented by vessels, and affording a good fishing station, Stornoway has advanced in extent and prosperity in a much greater degree than might be expected from the general nature of the district, of which it may be considered as the capital. It forms a kind of focus to the irregular and ill-conducted industry of the natives, but is too remote from the southern isles to have much influence upon them. Excepting at this point, the population occurs chiefly along the western coast, although in almost all the creeks and bays of the eastern, a little colony, or a solitary family, has taken up its residence. The inhabitants of Stornoway seem a different class of beings from those of the other part of the range, so much have civilization, commerce and industry improved their condition, which, nevertheless, is not the most comfortable.

Occupation of Land.—The tacksmen possess individually large tracts, of which they have leases. The small tenants or cottars have either small portions individually, or large farms, like those of the tacksmen conjunctly. The first class commonly occupy their farms in part with their own stocking, and subset the rest, usually a small portion, to cottars. In a few cases, however, the whole is subset, and sometimes occupied exclusively by the farmer. Among the small tenants, the general method has been to occupy a farm conjunctly. In this manner, most of the farms formed a kind of commonwealth, the houses being built together, but without order, the cattle pasturing in common, and the land under cultivation not being apportioned to each person in due quantity,

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but jointly occupied by all. When a particular spot or tract is to be turned, it is divided into small portions, and lots are cast upon it; and in this way the whole of the cultivated land is laid out. Among the common duties are herding the cattle, and guarding the corn against their depredations, by night as well as by day, there being no fences. These duties are performed either by persons hired for the purpose, or by one or two individuals from each family in rotation. Of late years a great portion of some of the districts has been laid out into small farms or lots, and the tenants have thus been separated.

Cattle.—On the tacksmen's farms the cattle are not housed in winter, excepting the calves; those belonging to the cottars commonly are. In summer, the cows and milk sheep are sent to the inland glens and moors, which are covered with hard grasses, Junci, Carices and Scirpi, because the portion that yields soft grass is not in general sufficient for their maintenance during the whole year. They are attended by a woman from each family, who has a small hut or sheiling for her habitation, and who makes the little butter and cheese which their scanty milk affords. On the tacksmen's farms, the cows remain in good pasture during the greater part of summer and autumn, the young beasts being then sent to the moors. Toward the beginning of winter all the cattle are brought to the lower grounds, and the stirks are separated and housed at night. The latter are fed exclusively upon hay and straw, portions of which are distributed to the other cattle during snow. The cattle of the small tenants are all housed at night during the winter, and are fed upon straw, hay, and the refuse of the family meals. Toward the end of spring all the cattle are in poor condition, and those of the small tenants frequently in most wretched plight, many of them being unable to rise without assistance. Sea-weed, chiefly *Fucus canaliculatus*, boiled with husks of grain, a little meal, or

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other substances, are then employed to support them, and in many places the cattle during winter and spring regularly betake themselves to the ebb to feed upon fuci.

Black cattle are small, but in general well proportioned. Those on the tacksmen's farms, and especially those belonging to the factors and clergy, are generally of good breed, and although not heavy, very handsome. They are covered with a thick and long pile during winter and spring. In this and other districts in the north of Scotland, a good pile is considered one of the essential qualifications of a cow. The most common colours are black, red, brown, or brandered, that is a mixture of red and brown in stripes. A whitish dun colour is also pretty frequently seen, not unlike that of the original wild cattle of Scotland; and it is remarked that in all their traditions or fables regarding what they call "fairy cattle," this is the colour ascribed to these animals. The breed of black cattle has been greatly improved of late years, by the importation of bulls and cows from various parts of the Highlands. Several of the stocks have been noted for their excellence, such as those belonging to Mr Macneill of Barray, to Mr Cameron, late factor for North Uist, and to Mr Stewart, factor for Harris.

The original sheep are of a very small kind, with white faces and legs, and furnished generally with horns. The idea that the sheep of the Hebrides, like those of Iceland, are frequently furnished with supernumerary horns, is erroneous, although an individual of this kind now and then occurs in a district, as in other breeds. The general colour is white, but individuals of various colours, blackish, dark brown, pale reddish-brown, and grey, frequently occur. In the black and brown sheep, the face and legs, and even the horns, are of the same colour. These sheep are very active, and frequently handsome, but on account of their small size, are less profitable than the larger black-faced breed, which has been extensively introduced of late years. It is worthy of remark, that

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while the latter often suffer to a great extent by braxy, the former are totally exempt from that disease, and the cross-breed suffers in a less degree.

Horses were formerly kept in immense numbers, which have of late been greatly reduced. They are small, but not diminutive, like those of Shetland, robust, hardy, active, patient, docile, peaceable, and easily maintained. Some of the horses are housed at night during winter, and especially spring, but in general they are allowed to feed at large. The breed is by no means fine, the head being invariably large, and the pile shaggy. There being few roads, horses are very seldom shod. There are no asses in the Outer Hebrides, nor would their introduction there be of any advantage.

A few goats may be seen in some places, but these animals are not favourites, although they seem to thrive sufficiently.

Poultry.—The common fowl and the duck are generally distributed, but no attention is paid to the rearing of poultry, there being no markets at which they can be conveniently disposed of. Of late, persons have begun to collect eggs for Glasgow and Greenock, and in Stornoway considerable quantities are used. Fowls and eggs are much smaller than in most other parts of Scotland. Some geese are kept by a few farmers, but are found troublesome.

Agriculture, Implements, Manure, Rotation, and Produce.—With reference to agriculture, each of the large islands may be laid out into two general divisions; one comprehending all the interior, composed of hills, glens, and moors, covered with heath and hard grass, excepting where the bare rock protrudes through the soil, which is universally peat; the other composed of that portion of land which skirts the shores. This varies in breadth, and the arable part of it is by no means continuous. Its soil is various: along the western coast principally sandy, in most other places half reclaimed,

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peat, and occasionally brown earth mixed with clay. The subsoil is generally clay, or a kind of angular gravel mixed with clay; but it is seldom that any subsoil exists, there being in most places but a thin coating of soil, lying directly upon the gneiss or granite. The solid rock appears here and there, forming great inequalities, so that in few districts, excepting along the sandy shores, a field of the extent of a few acres can be found free of such projections. This is the portion appropriated to culture, and is separated from the other by stone or turf walls, of the rudest construction.

These walls are generally about five feet high, and are constructed in a singularly slovenly manner. One side is perpendicular, being that next the sea, or cultivated land, the other sloping and composed of turf, the kind of ditch from which it is dug serving to increase the height of the wall. No regard is paid to neatness, and a dozen yards of wall, running in a right line, are hardly to be seen anywhere. Horses and black cattle are restrained by these walls in an imperfect manner, and sheep find them no obstacle to their incursions.

Before detailing the agricultural operations, it may be expedient to describe the instruments employed. These are the *cas-dirach*, or straight spade, the *cas-chrom*, or crooked spade, the ristle, the plough, the harrow, the rake, and the accoutrements of the horses. Excepting in the sandy fields of the west coast, and in a few other spots, the plough is seldom used, and, indeed, in most parts of the country can only be employed after improvements as to levelling and draining, of which there is at present little prospect, have been made. Some ploughs of the ordinary kinds, used in other districts, are employed by the principal farmers. The plough formerly employed, but now rarely used, is a miserable instrument, with a single handle. The person who directs this plough, walks by its side, using the right hand. It was usually drawn by four horses, preceded by a boy. The ristle is an instrument consisting of a horizontal piece of wood, from

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which projects below a curved culter, and to which is attached above a handle similar to that of a plough. It is used for cutting tough ground, preparatory to the action of the plough or crooked spade, and requires a man, a boy, and a horse. The straight spade is a clumsy instrument, consisting of a piece of wood about a foot and a half long, six inches broad, and three or four thick, the end of which is shod with a flat piece of iron, while there is attached to its left side a shaft about four feet long, like that of a spade, but without the cross handle. It requires two persons, one to cut the turfs, the other to raise them, and lay them on the ground upside down. The crooked spade consists of a horizontal piece of wood, nearly three feet long, four or five inches broad, and two inches thick, shod with iron like the former, and furnished with a curved handle, from five to six feet long, having a strong peg for the right foot at its lower part. It is driven into the ground horizontally, to the length of two or three feet, and turns over a furrow, similar to that of a plough. This is really an ingenious and useful instrument, without which large portions of ground in the Outer Hebrides could not be cultivated. It is especially adapted for shallow soil, immediately lying upon rock. The rake and harrow need no description. They are rude and clumsy in the highest degree. No carts being employed by the small tenants, and very few by the tacksmen, sea-weeds, dung, and fuel, are carried in wicker baskets or creels. These creels are slung upon a crooked stick, having two deep notches, laid across the back of a horse, with a piece of mat manufactured of sea bent intervening, the cross stick and mat being attached to the horse by a rope passed under his chest, and two others fastened to a stick laid across under his tail. The horse is led by a halter tied about his head, and frequently about his under jaw. Strings of horses thus accoutred are frequently seen, the halter of the one being fastened to the tail of the other.

The regular labours of the husbandman commence about

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the beginning of February, when he cuts the sea-weeds in such places as are not marked for the kelp manufacture, and spreads them upon the ground. These, together with what may have been gathered from the beaches in winter, he covers with turf and earth, forming ridges or beds, varying from five to eight feet in breadth, and separated by a chasm from which the soil covering the sea-weeds has been taken. These beds always run along a declivity, so as to allow the water to escape. They are seldom straight, owing to the irregularity of the ground. At this work all hands are generally employed for about two months, or at least six weeks, at the end of which time, the ground that had been manured and had produced a crop in the preceding season is turned, and new land is taken in. The beds above described are usually formed in peaty soil, and are appropriated to potatoes and barley. Sea-weed cut or cast ashore at a later period is commonly laid upon lower or sandy ground, and either ploughed in or covered by means of the crooked spade.

The manure employed, besides the various species of sea-weeds, of which *Fucus digitatus* is the most abundant, consists of dung and soot, brought from the interior of the huts, and of ashes and other refuse. Lime is never employed, nor could it be obtained without great expense. Shell sand, which exists of the best quality, and in inexhaustible quantity, is entirely overlooked; and of compost of any kind so little is made as to be hardly worth mentioning.

The labouring is seldom finished before the 20th of May, and during its continuance cattle of all kinds are allowed to wander over the land, which they are fond of doing for the purpose of nibbling the roots of grasses, as well as the braird. On ground manured with fuci, potatoes and barley are produced. On the same ground oats may be raised next year. Dung yields three crops; potatoes, barley, and oats, in succession. In ground taken in from pasture, the rotation is the following: the first year oats; dung being then applied, po-

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tatoes; then barley; the fourth year oats, without manure, and, in some cases, a fifth crop of oats. It is then allowed to run into grass, in which condition it remains for three or four years.

The only plants generally cultivated are the potato, the six-rowed barley or bear, the small or grey oat, flax and rye, the two latter in small quantity. Potatoes are generally soft or watery, especially in peat soil, manured with fuci; insomuch that, when boiled, the pulp may frequently be squeezed out of the skin in a mass. This is doubtless owing in part to the circumstance, that no attention is paid to the kind of seed employed. In good soil, manured with dung, the potato is dry, and equal in quality to the ordinary run of potatoes in the low country. In favourable soil, the returns of this plant are from 10 to 15 or 20; of barley from 12 to 20, sometimes 30; of oats from 3 to 4. These oats have a miserable appearance, and, in sandy soil, sometimes hardly attain a height of a foot. The straw, however, makes excellent fodder, and it is chiefly for this purpose that the plant is cultivated. The barley is, on the contrary, excellent. It is seldom cut, but generally pulled up by the root; the reason of which is, that the people, not finding it easy to procure thatch for their huts, economize their barley straw as much as possible for that purpose. Potatoes, which are planted from the beginning of March to the middle of April, are ripe about the middle of October, although a large proportion is raised from the middle of September. Barley is generally sown from the middle of April to the end of May, and is reaped from the middle of August to the middle of September. In sandy soil, instances frequently occur of barley ripening in ten weeks. Oats are sown from the middle of March to the middle of May, and are reaped in from sixteen to twenty weeks. Turnips are not raised by the small tenants, and by the tacksmen only on a few farms, and in small quantity; yet they thrive as well as could be wished. Cabbage or other culinary vege-

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tables are little employed, even the tacksmen being frequently without gardens.

Along the eastern coast, where there is no sand, and where the soil consists almost exclusively of peat, the natives contrive, by a very laborious mode of cultivation, to procure a scanty supply of potatoes and barley, with a little oats. The sea-weeds are cut early in spring, carried in creels by men and women, no horses being in general employed there, spread upon irregular patches of ground winding among the rocks, and covered by turfs dug with the straight spade, placed close together, with the grass beneath. When potatoes are planted in this ground, they are placed only a few inches apart, as if it were the best practice to obtain the greatest number of plants in the smallest space.

In all the agricultural operations, the women, especially the younger, lend their aid. During the summer, the potatoes receive some weedings and hoeings, and begin to be eatable by the beginning of September. They are secured in pits during winter. The corn is secured by the end of October, in small stacks, arranged in irregular and ill-constructed corn-yards in the vicinity of the houses, from which it is removed to the barns during winter, as occasion requires. Carts are not used, excepting by a few tacksmen, and in many parts would be useless, on account of the inequalities of the ground.

Preparation of Grain.—Oats are prepared by hand-thrashing, winnowing, kiln-drying, and subsequent cleaning. In districts where there are mills, the grain is with much labour and loss of time carried to them. Barley, of which the straw has been cut, is sometimes prepared in the same way; but more generally, and when the roots adhere to the straw, the ears are cut off on a sickle fastened in the wall, kiln-dried, and then thrashed and cleaned. A primitive mode of preparing oats is the following: a fire is kindled with a peat and a little straw, at which the ears are burnt off until a heap is

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formed, the fire being sufficient to scorch, but not to burn the grain, which is then cleaned and ground. The meal thus obtained is named *grattan*, and is considered a great delicacy; but the practice is not carried on to any extent. Various expedients are resorted to, at the commencement of harvest, for obtaining a small supply of meal; such as scorching grain with a red-hot stone, or in a metal pot over the fire. The mats and vessels required for preparing grain, and the bags for holding it, are made by the natives of straw and sea-bent. In some districts there are good mills, but in others the grain is chiefly ground by the quern or handmill. In Lewis there are numerous small mills of singularly rude construction. The wheel, consisting of a few flat boards, revolves horizontally. Its axis passing through the nether, is fixed into the upper millstone, which it causes to revolve. The mill is fed by a hole in the upper stone. The parish of Uig can boast of having eight mills on one brook, but they are mills of the above construction.

Fuel.—Excepting in Stornoway, where a little, and proportionally but very little coal, is used, the only fuel is peat. When the agricultural labours are completed, and some subsequent arrangements made, the next care is to provide fuel. Two or three days are sufficient for cutting peat enough to supply a family. The peats are turned once or twice until somewhat dry, then raised on end in small heaps, and finally stacked and covered with turf. They are carried, as occasion requires, to the houses, in creels, sometimes by horses, more commonly by women, frequently over hills and bogs, a distance of upwards of a mile. Along the east coast, the peat is more conveniently situated, the bogs being often within a few hundred yards of the huts. The inhabitants of many of the smaller islands cut their peats on the mainlands or on other islands; and it may easily be imagined to how many inconve-

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niences and dangers the transporting their fuel in boats over a distance of many miles must subject them.

Routine of Employment.—The general course of occupation among the small tenants is as follows. From the middle or beginning of February to the beginning of June, all hands are employed in the labours of agriculture. The cattle are then sent off to the hill pastures, or at least removed from the turned land, which they have hitherto been trampling without restraint. The peats are then cut, the subsequent care of them being left to the women and children. After this the men, and many of the lads and young women, betake themselves to the kelp manufacture, at which they continue till the commencement of autumn. The women and children tend the cattle, search the shores for sand-eels and shell-fish, and weed the crops. Then commence the labours of the harvest, which continue till the end of October, the men in the evenings fishing for cuddies. During winter, the men are employed in making and repairing their agricultural implements, making ropes of various kinds, mending the roofs, looking after the cattle, carrying the sea-weeds from the beaches with their horses, tanning their leather, and numerous minor occupations. The women spin their wool, dye the yarn, and convert it into clothing, prepare the flax in the same manner, and continue their usual employments. Upon the whole, the inhabitants of the Outer Hebrides cannot reasonably be said to be deficient in industry, although their industry might be better directed.

Manufactures and Trades.—The kelp manufacture is the only one of much importance. The process is generally known, and therefore need not be here detailed. The great diminution in the price of this article which has of late years taken place, cannot fail to be injurious alike to the proprietors and tenantry. On some parts of the coast, it is more easily

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manufactured than on others, and the price given for the labour of manufacturing a ton varies accordingly. In some places the fuci must be carried to a great distance to be dried, and in others have to be transported in boats. If one figures to himself a man and one or more of his children, engaged from morning to night in cutting, drying, and otherwise preparing the sea-weeds, at the distance of many miles from his home, or in a remote island, often for hours together wet to the knees and elbows, living upon oatmeal and water, with occasionally fish, limpets and crabs, sleeping on the damp floor of a wretched hut, and with no other fuel than twigs of heath, he will perceive that this manufacture is none of the most agreeable. The kelp of the Outer Hebrides is considered as among the best, and that of some districts has always brought high prices. The manufacture has been the means of procuring more favour for the people from the proprietors and factors than they would otherwise experience. From many places where the shores do not yield much sea-weed, and where the presence of small tenants is not necessary, the latter have been removed to make room for sheep and black cattle, which are perhaps more profitable. In every family the articles of clothing are made within doors; and a small supply of calico, handkerchiefs, and hats, is obtained from Glasgow by means of small dealers, annually, and in Lewis from Stornoway. Every chief of a family makes most of the utensils, implements, and furniture required. A few boat-carpenters, wrights, shoemakers, and tailors, are sufficient for all the other articles needed; and of weavers, or generally women who chiefly employ themselves in weaving, there is a considerable number. One or two tinkers stroll about from time to time, converting the horns into spoons.

Fisheries.—The fisheries are not of much importance, as they are at present conducted, there being no persons who apply their attention exclusively to them. The sea-dog

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fishery, on the west coast of Lewis, yields a considerable quantity of oil, which is disposed of to the Stornoway merchants. Along the east coast, generally, some herring is annually caught. In Barray, the inhabitants cure a good deal of cod and ling, which they carry in open boats to Greenock and Glasgow; and now and then a drove of grampuses, or a kerban, yield to their fortunate captors a supply of oil, which enables them to add to their comforts, and make up their arrears of rent. Along the west coast generally, the people do not fish much; but, on the east coast, where there are less surf, and better landing-places, the natives live in a great measure upon fish.

Roads, Markets, Modes of Conveyance.—In Lewis there are two roads proceeding from Stornoway, one in the direction of Uig, the other in that of Barvas. In Harris, there is a road from Tarbert to Rodell: in North Uist a road from Loch Maddy to the west coast; and, in South Uist, another near its southern extremity, from the east to the west coast. In many parts, along the west coast, carts might be used without regular roads in the sandy grounds; but the facilities for land conveyance are few, for which reason, even between parts of the same mainland, boats are commonly employed. It will easily be seen how much the expenses of the farmer are increased by the necessity of keeping boats. There are regular ferries between the large islands, and a communication is established between Stornoway and Pollewe on the Mainland, and between Harris and North Uist, and Dunvegan in Skye, by packet-boats. Several annual cattle fairs are held, as at Stornoway, Tarbert in Harris, and Lochmaddy in North Uist. The risk and expense attending the transportation of cattle to the Mainland or to Skye, necessarily diminish their value.

Improvements.—These islands are, no doubt, capable of

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receiving great improvement, although hitherto comparatively little has been done for them. After traversing the wastes of Lewis, one is agreeably surprised when he comes in sight of Stornoway, and views a neat little town, with quays and shipping, backed by a considerable tract of cultivated land, which has been reclaimed from sterile moss and bog. But the person who lands there from any of the more cultivated or picturesque parts of the Mainland, sees little to admire. The fields, which are small, are separated by dry-stone walls, without hedges or trees, and the surrounding country, even in the immediate vicinity, consist of gneiss and peat, pool and puddle. Passing along the range, he sees numberless expanses of sand, that might easily be secured against the inroads of the sea, lakes and bogs that might be drained, meadows that might be cleared and smoothed, tracts that might be converted into fertile land, by enclosing and draining; but in very few places does he meet with decided marks of human industry and energy. Some fields cleared and improved, at Rodell in Harris, the island of Ensay, Lochmaddy, and Boreray in North Uist, Nuntown in Benbecula, Askernish in South Uist, Kilbar in Barray, and other places, indeed shew that attempts have been made at improvement. In North Uist one or two small lakes have been drained, and in that district and Harris considerable efforts have been made to restrain the drifting of sand. *Arundo arenaria* has been planted in one or two spots, and large banks and pretty extensive tracts of sand have been secured by a covering of turf. Some trees planted in the neighbourhood of Stornoway have succeeded, but the situation is peculiarly favourable. In the Glen of Rodell, in Harris, there is a pretty extensive plantation, which has hitherto given promise of success. But, in general, trees do not thrive in these islands, as is evident from the diminutive size of the few planted in gardens at Stornoway, near the church of Rodell, and at Olligarry in Barray, which last is by far the most beautiful spot in the Long

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Island. For ornament, shrubs and bushes would answer nearly as well as trees, and seem more likely to thrive. The species which appear to be best adapted to these islands are the broom, the elder, the hawthorn, the alder, the common bramble, the dog rose, the downy-leaved rose, *Rosa tomentosa*, which is indigenous, and several species of willows, such as *Salix viminalis*, *alba*, *cinerea*, and especially the few indigenous species which occur along the mountain rills. Thickets of these would greatly beautify the glens, and might be beneficial in many respects. Great quantities of wattlings and hoops are annually imported, which might be procured by planting a few patches of moist and sheltered ground with osiers.

Exports and Imports.—The exports consist of kelp, herring, cod and ling, black cattle, sheep, wool, and oil. Other articles are exported, but in quantities so small as hardly to deserve notice. The imports are wood, hoops, wattlings, salt, iron, groceries, calico, hats, leather, oatmeal, and numerous other articles, such as cordage, fish-hooks and sail-cloth.

General condition of the Population.—There being eight parishes in the Outer Hebrides, there is of course an equal number of ministers of the Established Church, besides a considerable number stationed in the more remote parts and islands, together with a few catechists. In Barray and South Uist there are two Catholic priests. The clergy, in discharging their duties, are subject to very considerable fatigues, and sometimes dangers, as may easily be imagined from the nature of the country. Labouring among a scattered population, many individuals of which have to perform long journeys and voyages to hear a few sermons in the course of the year, it is to be lamented that they should find it necessary to engage in other occupations. There are eight parochial schools, and a considerable number of others, chiefly supported by the Gaelic School Society, and the Society for Propagating Christian

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Knowledge, together with a few kept up by voluntary contribution among the natives. Some years ago, a very foolish method prevailed in most of the schools. The scholars were made to read English, a language utterly unknown to them, without learning the meaning of the words; and I have often seen persons who could read with ease a portion of the Bible, or of any ordinary English book, without having the least comprehension of its import. Formerly the tacksmen were generally possessed of considerable literary accomplishments, and at the present day, ten or twelve young persons go annually to Aberdeen or Edinburgh, to receive instruction at the Universities there.

The tacksmen, in most cases, possess the necessaries of life, and even many of its comforts and luxuries, in such a degree, as to render their condition not unenviable. Family pride, an aversion to labour, and other circumstances, however, prevent them from exerting themselves in improving their farms, and in introducing new modes of culture. The greatest improvements have generally been made by persons who have gone from other districts to reside there.

The small tenants may be said to live from September to May chiefly on the potato, which is generally viscid and watery, together with a little coarse oat and barley meal, and occasionally a little flesh and fish. In summer they subsist upon a scanty supply of bread and milk. At this season the effect of poverty is very visible in their emaciated countenances; and such is their distress, that many are reduced to the necessity of searching the shores for shell-fish and sea-weeds. Fish they might have in abundance, but at this season the men are engaged in the kelp manufacture. A considerable quantity of oatmeal is imported by the proprietors, from the east coast of Scotland, or from Greenock, or the north of Ireland, and is sold to the kelpers, who have sometimes been known to eat up, in a few weeks, between themselves and their families, their whole summer earnings. In general, at

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any season, the poor people of these islands do not scruple to eat any fish, already half-devoured by birds, which they may chance to find upon the shores. Many animals which in other parts of Scotland would not be eaten, are occasionally devoured by them with great relish. Of these animals, however, some afford excellent food, and even the coarsest and most unsavoury, as the cormorant, the gull and the seal, are delicacies to persons so scantily supplied with the necessaries of life. The milk of their cows is excellent, but very scanty; the cheese which they prepare from it detestable, and the butter, although rich, filthy in the extreme. When the potato becomes eatable in September, the people begin to get into better plight, and the profusion of small fish obtained in autumn and the beginning of winter, adds greatly to their comforts. With clothing they are not in general ill supplied, and the coarse woollen stuffs which they wear are well adapted to the climate.

Emigration has for many years back been carried on to a considerable extent. It commenced upwards of thirty years ago in the Uists and Lewis, and of late has considerably increased. A large proportion of the inhabitants of Harris, reduced to extreme distress, by being crowded into places incapable of affording them subsistence, lately emigrated to British America. Whether this emigration ought to be encouraged or not, I am not prepared to say; but the people are strongly attached to their native country, and, unless when urged by extreme want, would never think of leaving it. The soil is evidently capable of supporting a much greater population; but the improvements in agriculture and arts do not keep pace with the increase of the population. Should the low price of kelp continue, the small tenant will be found less advantageous to the proprietors than farmers occupying large tracts of ground; and if the moral duties of a proprietor toward the people on his estates, are not such as

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to modify his desire of obtaining the highest rent, emigration must continue.

The establishment of fisheries in Barray, Lewis, and other parts of the range, by enterprising individuals, might be of much advantage to these islands; and a communication with Glasgow and Liverpool, by means of steam-vessels, would enable the farmers to dispose of their cattle to more advantage, and open a source of industry and emolument to the poorer class. Among the most obvious improvements to be made in these islands, are the diffusion of knowledge among the people; their religious instruction; the giving them a taste for personal cleanliness, and for neatness and comfort in their habitations; the increase of schools, by which they may attain a knowledge of the English language; a judicious subdivision of farms, not made in right lines, and separating equal portions of ground, without reference to the nature of the soil, or to the natural boundaries; the granting of leases, rendered conditional by the requirement of duties calculated to add to the comfort of the tenants as well as that of the proprietors; the introduction of enlightened persons, whose mode of cultivation might be followed; the improvement and diminution of the stock of cattle and sheep; and the establishment of villages. There are several stations very well adapted for this purpose, of which I may particularly mention Lochmaddy in North Uist, and Rodell in Harris. As the clergy are generally farmers, perhaps the influence which they possess over the people, might, by a little attention, induce the latter to imitate them in their modes of management; but it is more especially upon the factors that this duty devolves.

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[In publishing accounts of more remote districts, the Highland Society does not contemplate the communication of new or important information, to parts of the country already advanced in the practice of rural economy. It is, however, beneficial to make known the present state of different parts of the country, and the exertions that are in the course of being made for their improvement. It is with this view that the following account of the parish of Birnie, in the county of Moray, is published. It shows the very recent date of improvement in some parts of Scotland; but at the same time holds out the hope, that the spirit of enterprize having been at length excited, will continue to increase.]

A DESCRIPTION OF THE PARISH OF BIRNIE IN THE COUNTY OF MORAY. *By Mr* JOHN MARTIN, *Teacher, near Elgin.*

THE parish of Birnie is partly hilly and partly level. Its average length is about four miles, and its breadth three miles. It contains upwards of 6000 acres, of which 850 were under cultivation in 1796, and 2130 in 1829. On the hilly part, the soil is gravelly, or consists of gravel mixed with clay, lying partly on rock, and partly on a stratum of concrete gravel; while on the level part it is dry and sandy. About a hundred acres on the banks of the Lossie present a deep rich loam incumbent on sand. Over the whole parish there are interspersed tracts of peaty soil. It is divided into forty compact farms, eight of which occupy the level portion, the hilly part containing the rest. The extent of each farm varies from 20 to 120 acres.

Former State of the Parish.—At a very early period we

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find the parish of Birnie under the influence of very high ecclesiastical authority, which in those times generally guided the interests of the country, and in many instances proved highly beneficial to it. This circumstance, however, was not so conducive to the improvement of the parish as might naturally have been expected, for, until of very late, so little progress had been made in agricultural improvement, that the inhabitants were considered half a century behind their neighbours.

The system of husbandry formerly followed was very different from that now in use. Each farm was divided into four shifts, sometimes not very equal. One of these being finely pulverized by a few successive ploughings, was manured for a crop of barley. This crop was, in some cases, succeeded by three successive crops of oats, each obtained by a single ploughing. Sometimes a crop of rye, when the soil suited that kind of grain, varied the succession. The land under this shift, when rendered unfit to produce another crop, was left in its natural state, or laid out for pasturage, artificial grasses not having been then introduced. Each lot in succession underwent the same treatment, and this practice prevailed over the whole parish. The corn seed of each farm was in the soil by the first of June, and the plough, with all its accompaniments, reposed upon the joists until the conclusion of harvest. The live stock, which consisted of black cattle, horses, and sheep, was maintained during winter on straw, and in summer on the natural pasturage of the farm, or that of the hill ground.

The implements of husbandry were of rude construction. The plough was formed on no mathematical principle. Being made by the tenant himself, it was of the rudest workmanship, and had no other ironwork than the coulter and share. The harrow was equally rude, having wooden teeth, which, moreover, were very disadvantageously placed. At a period still within the remembrance of some of the tenants,

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manure was carried to the fields in baskets formed of willows or twigs, which were slung upon the horses, their lower parts being connected by a hinge, so that, on turning a latch, they were inverted, and thus discharged the load. The kellach was another vehicle for the conveyance of manure. It consisted of a conical basket of wickerwork, placed in an inverted position between two shafts, extended from the axle of two unwieldy blocks of wheels. Carts of a very rude construction were also common until of very late. Their wheels were about two feet in diameter, and were composed of three pieces of plank some inches thick, having a square hole in the centre, to which the axle was fitted; the axle revolved with the wheels, within wooden bows fixed under the sides of the body of the cart. The shafts and other parts were of birch or alder.

Previous to the commencement of the present century, the parish was thus in a very rude state. Situated in a very secluded part of the country, it presented few attractions, and its means of communication with other parts were comparatively few. Bad roads are the best criteria of the backward state of a country; and a person might as easily have travelled over the glaciers of Mont Blanc in his barouche, as he could then have performed a tour through the parish of Birnie. It was not uncommon to see a road formed entirely by the humour of an old crazy animal, which it seems had more sagacity than his master, in striking out a sure pathway. In fact, the roads were generally formed in this manner, and seldom received any repairs.

The parish had long been entirely destitute of plantations, —a circumstance which, besides adding greatly to its barren and naked appearance, left it exposed to the influence of the north and easterly winds, so unfavourable to vegetation. Perhaps a solitary tree appeared here and there, amid the rude rocks, and by the roaring waterfalls of Glenlaterac, but there were no woods. Remains of oak and fir, however, oc-

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curred in great quantities in the morasses; but these only served as memorials of the times that had been.

Nothing tends more to prejudice a visitor against a country, and to impress upon him the idea of its poverty, than the neglect of domestic comfort, and the want of adequate buildings. About ten years ago, it was not uncommon to see a range of buildings formed entirely of turf; and a tenant who had his dwelling-house built of stone and lime, was considered as possessed of superior means. To have then recommended to a farmer a more enlarged range of premises constructed on improved principles, such as we are now accustomed to see, would have been looked upon as preposterous.

It would be of little use to state the other circumstances connected with so rude a state of husbandry. Suffice it to say, that, till within these twenty years, no improvement of any importance had been made either in the system of cultivation or in any department of rural or domestic economy, and that till within the last ten years, an acre of improved land was rarely to be seen.

Present State of Agriculture.—The first step which the husbandman takes, when he becomes possessor of a farm in this district, is to lay it out into five or six equal shifts. It may here be mentioned, that tenants are under no obligation to leave their farms, when they remove, under a proper rotation. On the contrary, when a tenant purposes to resign his farm at the end of a lease, or when he is apprehensive of losing it from a higher offer, he considers it his interest to exhaust the soil by a succession of crops, which leave the land weedy, and in the most wretched condition. The efforts of the incoming tenant must necessarily be exerted in a high degree; and when the whole farm is in the same condition, it is of little consequence whether he retain the original formation of shifts, or form others according to his own views. The latter practice is the common one; and the portion al-

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lotted to the cleaning operation is prepared by one or two ploughings. About April, part of it is planted with potatoes, manure being sometimes applied, sometimes not. The land is always limed, however, either at the previous ploughings, or at some stage of the growth of the crop. The potatoes are planted in drills, which are about three feet in breadth, and separated by an interval of one foot. The common practice is to cover them when planted by harrowing, and about a week or ten days after to form the drills by ploughing. When the land is in a very wild state, it is again harrowed, before the plants make their appearance. It afterwards receives two hand-hoeings, being run each time with the drill-harrow, and the earth is then raised about the roots of the plants by a drill-plough, or more generally by the common plough. The return varies according to the quality of the soil, and the nature of the season, but may be stated at the average of 800 stone avoirdupois per acre.

The great object which the farmer has in view in planting so much of his land with potatoes, is to obtain a subsequent crop of wheat. Potatoes arrive at maturity by the end of October, or in some seasons earlier, and the ground, when cleared of them, is immediately prepared for the wheat crop. The land is completely pulverized, the potatoes being at the same time carefully gleaned, and, after one or two ploughings, is plentifully supplied with manure. Sometimes a portion of the same field, being in fallow, is joined to the potato land, and manured in a similar manner. The extent of ground allotted to this crop is generally measured by the quantity of manure, and at this period, every corner, even to the pigeon-house, is cleared to augment the supply. The seed is pickled, to guard it from disease. For this purpose a strong lie of urine is sometimes used, or the seed is mixed with a quantity of quicklime till it assume a whitish appearance. A change of seed is also an important object. But even with all precautions, diseases prevail in the wheat crop

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to a great extent. The quantity of seed allowed to an acre varies from three to four bushels, and the average return is six quarters.

It is very often the case that a large portion of this shift is grown with turnips, and it may be mentioned that a less extent of it is fallowed when there is a plentiful supply of manure for this crop. The season of sowing commences some days before the first of July. The turnips are sown in drills, after the plentiful application of manure, and are always twice hand-hoed, and run with the drill-harrow as often as is requisite. Pease often occupy a portion of the same shift. Two varieties only are cultivated in the fields: the early grey kind, and the small black pea. The land is prepared for them by two ploughings, without manure.

The crop which generally succeeds turnips and pease is barley. Sometimes, however, a crop of oats is grown, although rarely, unless when barley is not a saleable article. The land is always manured after pease, but very seldom after turnips. The quantity of barley seed allowed to the acre is between three and four bushels, and the mean return about six quarters. Artificial grasses are sown at the same season with the barley. Two bushels of ryegrass, ten pounds of clover, and a small quantity of rib-grass, are allowed to an acre. The same quantities are also allowed to the wheat-crop, and are generally sown in spring.

Thus the first shift is duly cleared and prepared for a state of rest; and in this manner the farmer proceeds with each of his shifts in succession, until they are all reduced to a proper state of cultivation. If the farm is divided into five portions, one of them is cleared each year. Five years therefore elapse before the last allotment is reached. But it must not be understood that the land has been producing corn crops during this lengthened period; for it is a common practice with the incoming tenant to sow grasses in a portion of the former occupant's corn crop. This serves him for pasturage in a limited

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degree, and prevents the land from being exhausted. At the end of two years, or when the field has been two years in grass, or sometimes when it has been so for three years, it is broken up and sown with oats. In some instances, however, a portion of the field is broken up in the end of the second year, manured, and sown with wheat; but this practice is considered as exhausting the soil too much. Two crops are generally grown after two or three years' grass, the land receiving two ploughings previously to its being sown, after which the lot reverts to its former or first rotation. The allowance of seed to the acre is four bushels, and the return between six and seven quarters.

Implements of Husbandry.—The implements now commonly used in the parish are the cart, the threshing-mill and fanners, the plough, the harrow, the drill-harrow, and the turnip-barrow, or box and roller. The cart costs from £6 to £8. The threshing-mill is not in general use. One on a limited scale costs £40. Fanners are in general use, even where the flail is also employed, and cost about £3. Ploughs are very much improved, and, with the harrows, correspond in form with those used in the best agricultural districts. The iron plough is in use through the greater part of the parish, and the iron harrow is employed on a few farms. A wooden plough mounted, with all its accompaniments, costs about £1, 10s.; an iron plough about £3, 10s. A pair of wooden harrows may be had for £1, and a pair of iron ones for £3. There are two kinds of turnip-barrows in use, the single and the double, the former costing about £1, 10s. the latter £3, 10s.

Plantations.—About 450 acres are under wood. The plantations, excepting one, partly formed 20 years ago, have all been commenced within the last five years. The trees are of the Scotch fir and Larch species, and in general present a

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very thriving appearance. Besides the regular plantations, there are detached plots of larches, which add greatly to the beauty of the parish.

Roads.—In this district roads have not been improved in a degree corresponding to the general progress made in the parish. Good roads are of primary importance in any country, and especially in one like this, where the inhabitants are daily making advances in all the departments of agriculture. It is therefore obvious that the improvement of those already existing, and the formation of others, are absolutely necessary.

Dwelling-houses and Offices.—Premises on an extensive scale were long wanting in this district, but now, every farmer has his houses formed in a convenient manner, and of the best materials. They are built of stone and lime. Many of them are covered with slates or tiles. The dwelling-houses plainly show that a taste for domestic comfort prevails in a high degree, being neat and clean in their interior, the abodes of industry and economy. There are eighteen extensive and convenient squares in the parish. Houses are appropriated to an incoming tenant by valuation, and when they are built at the expense of the proprietor, the tenant pays at the rate of five per cent. on the money advanced till the end of the lease.

Improvement of the Soil.—In reclaiming land from its original state, the inhabitants of the parish of Birnie have displayed a greater degree of exertion than those of any district in this part of Scotland that has come under my observation. The whole arable land of the parish amounted, in 1796, only to 850 acres, and until 1810, had not exceeded 1000 acres. At the present day, 1819, it amounts to 2130 acres, an increase of 1130 acres, improved partly from moss ground and partly from moorland, having thus been obtained in 19 years. A greater

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impulse is doubtless given to the industry of the people of this parish than to that of the inhabitants of many others, by the circumstance that the Earl of Seafield, the honourable and excellent proprietor, advances the sum of £5 for every acre of land improved on his property. From £500 to £708 are expended yearly on this parish for reclaiming waste land. Each tenant has a lease of nineteen years, and pays 5 per cent. on the money advanced. Such encouragement cannot be too highly appreciated, for it has been the means of reclaiming many an acre of land, which, without it, would still have remained in its original state. At the same time, it enables the tenant to cultivate his lands in a proper manner, and eventually benefits the proprietor as well as the tenant.

The system adopted in reclaiming moss land is the following: The first step is to form a proper set of drains in the manner best calculated to draw off the superfluous moisture, and to intercept the lines of springs and rills. The drains used for these purposes are open and under drains, aided by furrows, to draw off any accumulation of surface water. After the land has been well drained, it undergoes the process of paring, which removes the vegetable surface of the ground, and prepares it for the burning process. This is done by carefully exposing the turfs or parings to the sun and drying winds. When completely dried, they are formed into heaps, and burned till the whole is reduced to ashes, which are then carefully spread over the surface and ploughed down. Sometimes wheat, barley or oats are cultivated on the improved ground; and it seldom fails to produce very great crops. The expense of paring an acre of moss land is about 25s.

In reclaiming moor land, the process differs materially. The ground receives one ploughing in winter or spring, when it is softest, and is left in this state for twelve months. In the spring, it is cross ploughed, when it has become tender, its vegetable parts having decayed. Lime is now applied, and mixed well with the soil by harrowing, from 20 to 25

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bolls being allowed to the acre. Manure is also sometimes applied, and the whole ploughed down and sown with oats, wheat, barley, or pease, generally the latter, as they are found to answer best for ameliorating the soil, and preparing the ground. The produce of these lands depends very much upon the comparative goodness of the season, and the manner in which the land has been cultivated; but in general the crops raised upon them are amazingly great. In some parts of the parish, trenching is practised in improving the soil, but it is applied only where the ground is too stiff and stony to be worked with the plough; and the expense is so very high, that it is very seldom used, when it can be avoided. Land is trenched for one shilling per rood, or L. 8 per acre.

Application of Lime.—Lime is one of the most valuable materials applied to the soil, and without which it would be impossible for the cultivator in this district to reduce his lands to the state of productiveness in which we see them. By means of it, the cold rugged soils of the hill part have been converted into comparatively rich and fertile land. Common manure has indeed been applied to new lands with some effect, but without permanent benefit; whereas lime applied in sufficient quantity displays its beneficial effects through the whole course of a lease. It is only, however, when accompanied with the application of manure that lime produces its fullest effect upon new lands. At an average, 2200 bolls of lime are distributed yearly over the lands of this parish, and the quantity allowed to an acre varies from 20 to 25 bolls.

Black Cattle.—When some attention began to be bestowed on the rearing of cattle in this parish, a coarse Dutch breed was first introduced. These cattle were more weighty than the original breed, but less handsome, and more difficult to be maintained. They gradually disappeared, and the Lancashire breed became for some time the favourite one. It also

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has been given up, being accounted less handsome and more delicate than the true Scotch Highland breed, which alone is now reared. Very handsome bulls of this kind have been introduced from the Isle of Skye and the West Highlands. It was long considered the best practice to keep bulls of very large size, but experience has shewn it to be injudicious, and cross-breeding with Highland bulls has been for some time continued with success. The number of black cattle in the parish amounts to 600. They are pastured during the summer on rich grasses, and in winter are fed on straw and turnip. Some of the cattle are remarkably fine, and in excellent condition; for at a late market, a lot of three-year-old stots sold at £10 a-head.

Sheep.—The black-faced Highland sheep was formerly the favourite breed throughout the parish; but now, excepting on some farms, the Cheviot breed has completely displaced it. Mr Brown has 700 Cheviot sheep on the farm of Gedloch, and about 300 on the farm of the Quarry. Mr Duff has 300 very fine Cheviots on the farm of the Barden; and, so far as my inquiries have led me, I have calculated the number of sheep in the parish at 2232. The Cheviot sheep appear to thrive remarkably on the fine hilly pasture connected with the district; so much so that I believe they will soon be universally adopted. The mountainous district of the parish is in general dry, producing the most wholesome pasture, and is therefore well adapted for this breed.

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ON THE MANUFACTURE OF LEATHER FROM THE SKINS OF CETACEOUS ANIMALS. *By Dr* LAWRENCE EDMONSTONE.

CONSIDERABLE numbers of the Ca'ing Whale (*Delphinus Melas* of Fleming) are annually driven on shore by boats in the Zetland Islands. They are often taken in a similar manner in the Orkneys, and, I believe, occasionally also in the Hebrides.

The main object for which these animals are captured, is the oil afforded by their blubber, each whale yielding, on an average, about a barrel, of 32 gallons. The carcasses, it is obvious, would be invaluable as manure; but, with the exception of a few active and intelligent individuals, who have now and then availed themselves of this advantage, they are allowed to waste on the beach, or be floated out to sea.

It is long since it occurred to me that the skins of these whales would be of great utility to the peasantry of the islands, who annually consume a large quantity of coarse leather in their outer garments used in fishing, and in rough shoes or sandals on land; and since the legislature has removed every restriction on the practice of tanning, the suggestion of this idea of whale-skin leather may be of some importance to them. What is vulgarly considered to be the skin of the whale, is the scarf-skin or cuticle, which very much resembles black silk, is equally tenuous, and utterly useless. The true skin lies beneath this, immediately above the blubber, and is, in the adult animal, about the thickness of the hide of a cow, but much more pliant and elastic. It is composed of the same substance (gelatin) as the skins of other mammiferous animals, and possesses the same general texture and appearance. About four years ago, I put a piece of this whale-skin into an infusion of oak-bark, where it remained about a month. It had been previously scraped, and immersed for some days in a paste of lime and water. A specimen of this is now pre-

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sented to the Society; and although little care was bestowed on its preparation, it will sufficiently show what may be made of it. Another piece of the same skin was kept in a solution of alum for two days; and a specimen of it is also sent.

If we remember that, in the Zetland Islands, almost every peasant is a fisherman, and that, to be adequately equipped for his arduous and perilous occupation, he requires a jacket and trowsers of tanned skin, that he and his family require the same material for shoes or sandals, and that he is sufficiently acquainted with the art of tanning to prepare leather for these purposes, we shall perceive the benefit of suggesting to him the means of supplying himself so easily and cheaply.

The largest whales of this species are about 24 feet long, their greatest circumference 10 or 11 feet. Hundreds of them are frequently taken; and if the skins were preserved, the supply of this useful article would be most abundant. In cutting off the blubber, *flenching*, nothing is more easy than to divide it into larger pieces than is the practice to do. The blubber would thus be equally productive, and the skin saved. The practice of boiling the skin along with the blubber in the extraction of the oil, is injurious to the quality of the oil, by dissolving in it gelatin, which is mainly instrumental in producing rancidity.

Moreover, these skins, if not consumed in the islands, might be exported for the preparation of glue, or for other purposes. It is singular that the fishermen should not have thought of applying them to some use, since they employ the skin of the porpoise, a congenerous animal, as *grummets*.

In the Feroe Islands, where these whales are peculiarly numerous, many are caught every year; and they constitute an important source of the wealth of their inhabitants, the oil being exported, and the flesh dried or salted for food. Yet I am not aware that the Feroese have thought of making any use of their skins. In Cook's last voyage, it is mentioned that the natives of Kamtchatka use the skins of whales for leather.

BALTA-SOUND, Zetland, 20*th September* 1830.

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DESCRIPTION OF AN APPARATUS FOR STEAMING POTATOES, TURNIPS, AND GRAIN, AS FOOD FOR DOMESTIC ANIMALS.

By Mr DAVID LIDDELL *junior.*

THE apparatus consists of a furnace and cast-iron boiler A, for generating steam. The contents of the latter may be about 60 gallons. It is furnished with a safety valve, to render it secure from danger, even in the hands of the most ignorant person. This boiler is intended to supply warm water for any domestic purpose, as well as steam, the water being drawn off by a cock in the lower part of it. The boiler is supplied with water from a cistern, B, placed 5 or 6 feet higher than the boiler. This cistern may contain about 30 gallons, and when filled requires no farther attention, as the boiler regulates its supply of water, by means of a float in the inside of the boiler, attached to a valve in the cistern, which contains as much water as will boil 10 cwt. of potatoes. The two casks, C and D, are for holding the produce to be steamed. They contain about 3 cwt. each. The steam is conducted from the boiler to them by a pipe (1 inch), branching off to each with stop-cocks. As many casks as may be necessary for the supply of food may be attached in the same way. The casks are furnished with sliding hatches in the bottom, for taking out the food when ready, and are raised as far from the ground as will allow a trough or barrow to be introduced under them, to receive the contents.

For boiling grain, the cask for holding it differs from those used in steaming potatoes, only, by not having a hatch in the bottom, as the hatch could not be easily made tight, which is necessary in boiling barley, as water must be mixed with it in the same quantity, or nearly, as if it were to be boiled in a boiler in the common way. It may be added, that the hatch not being tight in boiling potatoes is an advantage, and even necessary for allowing the condensed steam to run out, and also all the earthy matter from the skins of the potatoes.

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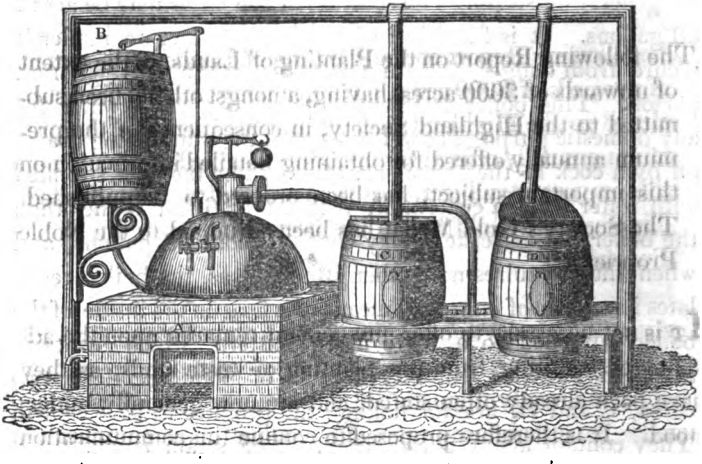
In the Figure, one of the casks is represented with the lid pressed down, by means of the vertical bar, which is employed for this purpose during the operation of steaming or boiling. In the other cask, the lid is represented as opened, with the vertical bar moved to one side.



[The preparation of roots and grain for food, by steaming or boiling, is an improvement on the mode of feeding our domestic animals, which cannot be too generally extended. Although methods of preparation are sufficiently known, yet they are not all alike good; and, for this reason, the Society has ordered the publication of the preceding description, as showing an arrangement of the apparatus for steaming, cheap, simple, and convenient.]

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REPORT ON THE PLANTING OF LANDS ON THE AIRLIE ESTATES IN FORFARSHIRE AND PERTHSHIRE, UNDER THE MANAGEMENT OF MR WILLIAM ANDERSON. *By the Right Honourable the* EARL OF AIRLIE.

[The following Report on the Planting of Lands, to the extent of upwards of 3000 acres, having, amongst others, been submitted to the Highland Society, in consequence of the premium annually offered for obtaining detailed information on this important subject, has been ordered to be published. The Society's Gold Medal has been adjudged to the Noble Proprietor.]

It is not necessary to offer any general remarks upon the advantages resulting from the planting of waste lands, as they have been already often stated, and are now generally understood. It is therefore proposed to confine this communication to the particulars directed by the Society to be more fully adverted to in such reports, and to a few general observations connected with the subject.

Tract of Land, Soil, Climate, and Exposure.—The lands planted are situated in different parts of the country, and vary considerably in soil and climate. There is a large tract situated in the parishes of Cortachy and Tannadice, on both sides of the rivers Esk and Prosen, and on the adjoining hills to the northward. The banks of the rivers have a northern and southern exposure, and, with the lower parts of the hills, consist chiefly of a black and brown loam, with a mixture of clay and mortar in the bottom. These parts are planted with oak and various other kinds of hardwood, with a mixture of larch and other firs. The hilly ground, which rises, at the greatest, to the height of 900 feet above the level of the sea, has a southern and eastern exposure, and consists generally of a

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light brown loam, with a mixture of moss and rock in the bottom. It is planted with larch and Scotch fir, and both here (even on the highest parts, where the soil is very thin) and in the other parts of this tract, the plants are in general thriving remarkably well.

There is another large tract situated in the parishes of Airlie and Lintrathen. In the lower and more level part of this, the soil is a rich brown and black loam, with a rocky and clayey bottom; and the plants used are oak and other hardwood, with a mixture of larches, spruce and Scots fir. In the higher places, which form part of the Grampians, and have a southern and northern exposure, the soil is of a light nature, with a mixture of moss and gravel upon a stony bottom; and the larch and Scots fir are here the only plants used. In the high grounds the climate is cold, but the plants are healthy and thriving.

A third tract is situated in the parishes of Alyth and Glenisla, with a northern and southern exposure, the high grounds forming part of the Grampians. The soil in the higher parts is a rich black loam, with a mixture of moss; and the plants used are larch and Scots fir, which are thriving moderately well to a considerable height, although the climate is extremely cold. In the lower parts, the soil is occasionally a rich brown loam on a clay bottom, and the remainder moorish and light, on a bottom of moss and rock. In the richest places oak and hardwood are planted, and on the moors, larch, spruce and Scots fir.

A fourth tract forms part of the Sidlaw hills, on the south, in the parish of Auchterhouse, the lowest part of which planted is about 600 feet above the level of the sea, and the average height above 900 feet. The lower parts consist of a rich brown loam on a slaty bottom, and the higher parts of a moorish light soil, on a bottom of moss, gravel, and slate. In the former, oak and other hardwood are planted, and in the latter, larch and Scots fir

The only other lands yet planted are in the parish of Clunie.

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They have a western and northern exposure, and consist, in the lower parts, of a rich black and brown loam, which are planted with oak and other hardwoods; and in the higher, of a light soil, being a mixture of sand and moss upon a rocky bottom, planted with larch and different kinds of fir. The highest ground planted in this district is 640 feet, and the lowest 166 feet, above the level of the sea.

The grounds planted in any of the parishes above stated do not form continued plantations, but are intermixed with lands under aration, and pasture lands under lease. Some of these plantations are, however, of considerable extent: as, for instance, in the parish of Cortachy one of about 500 acres; in the parish of Tannadice one of about 450 acres; in Lintrathen one of 300 acres; and in Glenisla one of 400 acres.

Kinds and number of Plants.—A table (No. I.) has been prepared, to show at one view the different kinds and the number of plants used during the present and last five years. There has also been appended a table (No. II.) showing, but more generally, the kinds and the number used from 1811 to and including 1824.

Extent planted.—The extent of ground planted by the present forester has never been exactly ascertained; but judging by the number of plants used per acre, a tolerably correct estimate of it may be formed. In planting the different kinds of fir, there is allowed a distance of from $3\frac{1}{4}$ to $3\frac{1}{2}$ feet between each, which gives a total number, per acre, of 4470 plants; which, indeed, is precisely, one acre with another, the number used. In planting an acre with hardwood intermixed with fir, the same number of plants is used; one-half of the different kinds of the former, and the other half of the latter; so that, by dividing the total number of plants used by the number per acre, the extent of ground planted may be found very nearly.

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The total number of plants for the last twenty years is, by Tables Nos. I. and II., 14,339,570, which, divided by 4470, gives 3208 acres. The total number for the present and last five years is, by Table No. I., 5,544,070, which, by the same process, gives 1240 acres.

Age of Plants, and previous Treatment.—The age of the plants to be used is a most important matter in the process of planting, and the reporter's experience on this falls to be more particularly noticed.

Larch.—One-year seedling larch, one year transplanted, he has found to be the best age for high and exposed ground, the plants thriving better than when older and of larger growth. In sheltered ground they may be used two years transplanted, but not more. In transplanting seedling larches, the reporter lays them out in beds 4 feet wide, with an alley of 15 inches. If the drought is severe, and the ground dry, the roots are moistened with a mixture of earth and water, and they are planted at distances of from 2 to 3 inches, at which they are allowed to remain, if they are to be used the same autumn; but, if not to be used until another season, every alternate plant is taken out to leave sufficient room to the remainder.

Scotch Fir.—Two-years' seedlings, one year transplanted, are considered the best age for this fir. It is a common practice to transfer the seedlings at once to the forest; but it would appear, that, in all situations, they will be found to thrive greatly better if previously a year transplanted. In the nursery, beds are used similar to those for larch, and the plants are laid in lines, with about six lines in each bed. Both this fir and the larch are hand-weeded, the hoe never being used, for it has often been observed, that plants whose bark has been ruffled by that instrument, canker and die, after having been perhaps five or six years in the forest in an apparently thriving state.

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Spruce and Silver, and Balm of Gilead and other Firs.—All these firs require two years in the seed-beed, and to be two or three years transplanted before they are fit for use. The treatment of them all is similar to that for the larch and Scotch fir.

Oak.—The treatment of the oak is as follows:—The acorns are sown in the nursery in beds of 18 inches breadth, 1 foot apart, or in lines in larger beds, leaving, in either case, a space of 9 inches or 1 foot for each line. The ground being kept quite clear of weeds (by hand-weeding), the plants by the end of the year are from 9 to 12 inches in height, at which time they are taken up and placed in lines from 20 to 24 inches apart, and from 4 to 6 inches from plant to plant along the lines; and in this operation the knife should be applied to the roots more sparingly than is frequently the practice. The plants are then allowed to remain in these lines from three to four years, being carefully weeded all the while; and during the second year, in the spring, as soon as the weather becomes mild, they are neatly pruned with a knife, and if any appear stunted in the growth, these are cut over, close to the surface of the ground. At the end of the third or fourth year the plants are from 2½ to 4 feet high, and have excellent roots for planting out in the forest. In lifting, great care must be taken of the roots, and the knife here again applied, but sparingly, and only to the strongest of them. It is of advantage at this time to prune a few of the strongest side-branches, with a view to throw more strength into the leading shoot.

The reporter is aware of a considerable difference of opinion in regard to the proper treatment of the oak; some practical men reprobating the transplanting of it, others defending that process, and both parties suggesting modes of treatment different from each other. The practice above stated is that which has of late been constantly employed, and no injury has been seen to arise from it. In fact, there is abundant

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reason to believe that as good trees may be raised by it, and at less expense, than by any other course whatever. It is not, however, meant to be said, that it is indispensable to transplant oak; on the contrary, the only objection to sowing the acorns in the field, is the impossibility of sufficiently protecting them, unless at a very great expense, from hares, rabbits, mice, and other vermin, and the greater trouble of keeping the plants properly free of weeds. If they are not sufficiently protected, there is almost a certainty of the seed being nearly altogether destroyed, and, in some instances, this has actually occurred. If this risk, then, be taken into account, and the additional expense of protecting (if it is possible to protect sufficiently), the method of transplanting would appear to be by far the least expensive; and no experience has yet shown that the plants are more healthy and more vigorous, or attain greater excellence, by the one method than by the other.

Ash, Elm, and Beech.—The age and method of rearing given above for oak, are found to answer for these and other kinds of hardwood most in use for plantations.

In rearing hard wood for hedge-rows, the treatment, after the first few years, varies a little. When the plants have been two or three years transplanted, every other line should be taken up so as to leave a distance of from 3 to 4 feet between each of the remaining lines, and the plants in these lines should be thinned, so that the distance between each may be from 2 to 3 feet. They may remain in this state until they are the height of 8 or 10 feet, when the tops are beyond the reach of cattle, when they may be lifted and planted in the hedge-lines, in pits made sufficiently large to receive the roots without injury.

Where there has been occasion to plant clumps of trees for appearance, or for shelter, a mixture of hardwood and fir has been used. The former is treated in the same manner as for hedge-rows, and the latter is transferred from the plantation, as thinnings, at a height of from 4 to 6 feet, taking great care

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of the roots, and leaving a large ball of earth attached to them.

Evergreens and Shrubs.—All the varieties of these make excellent underwood; and, when used to fill up plantations, are very ornamental, and wherever planted, afford excellent cover for game. Considerable quantities have been used on the Airlie estates. A plot or two of ground, well sheltered, and not much exposed to the sun, is prepared; and, if the soil is strong, there is added a mixture of moss and sharp sand; or, where moss is not to be got, decayed leaves, or any vegetable mould, which makes the soil of a free and kindly nature, and suitable to almost every kind of shrubs, particularly American plants. Into a bed thus prepared, there are transplanted two-year old seedlings, in lines from 15 to 18 inches apart, and with 6 or 8 inches between each plant. They are allowed to remain for two years, and then lifted and replanted in the same or similar ground, in lines from 2 to 2½ feet apart, and at a distance between the plants of 1 foot. They are left there for other two years, by which time they have excellent roots, when they are taken up, with balls of earth at the roots, and transferred to the plantations, or wherever wanted, in the end of April or beginning of May, or in September, which are found to be the best seasons.

They are planted in large pits, and it is found of advantage to add a quantity of the above mixture to the natural soil; and, if the weather be particularly dry, to water them once or twice after planting.

Preparation of Ground, and Mode of Planting.—The methods which are followed in planting, and the preparation of the ground, will now be described. The first object (as on it every thing else is conceived to depend) is to drain and enclose the ground.

Draining.—Draining depends upon so many circumstances, the nature of the soil and subsoil, and the inclination

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of the ground, that, without extending this report to too great length, a precise account of the practice in that particular cannot be given. The general method is to lay out the ground in beds of from 20 to 30 feet wide, and to make leading drains 5 or 6 feet wide, and from 2½ to 3 feet deep, with smaller drains running into them of 3 or 4 feet wide, and from 1½ to 2 feet deep. Either the leaders or the smaller drains are made to cut off springs where such occur; and, by this mode, and by altering it according to circumstances, increasing or diminishing the number of smaller drains, and increasing or lessening their depth, land of the kind usually planted is dried at no very great expense.

Fencing.—The fences which are considered best, and are chiefly used, are of three kinds. First, a ditch with hedge, and paling where a hedge is wanted. The ditch, 6 feet wide and 3 feet deep, with a scarcement of 15 inches; the paling a single rail; the hedge laid either with thorns or beech, or both mixed, according to taste. The cost of this fence is 2s. 8d. per rood of 18½ feet. Second, A turf fence, which is that generally used: the turf-dike, 3½ feet high, with a ditch in front, 6 feet wide and 3 feet deep, leaving a scarcement of 18 inches between it and the dike, the whole earth thrown to the back of the dike. This is sufficient as a fence for cattle; but, where there are sheep, stakes about 5 feet long are driven into the scarcement, at distances of 6 feet, with a spar across their tops, making the fence, ditch included, about 7 feet high, this spar being supported at every third stake by driving a short stake 4 feet back from the rail, and nailing a spar betwixt the short and long stake.

In addition to the above, it is necessary, in sloping ground, to have a small drain at the back of the fence, 3 feet wide and 18 inches deep, to receive the surface water; and, at proper distances, to have small conduits to convey the water from the back to the front drain. Thinnings of larch, from twelve to fifteen years of age, make an excellent and cheap railing;

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and, if larches are planted upon the top of the dike, at the distance of a foot, or if whins are sown upon it, the railing does not require to be renewed. A fence of the above description, where no back drain is required, costs about 2s. 6d. Sterling per rood of 18½ feet with the railing, and about 1s. 10d. without it. A third is a sunk fence used only about pleasure grounds. The sink is cut to the depth of 4 feet, and 3 feet wide at bottom, and gradually sloped to the inside, to the breadth of 10 or 12 feet at the top. It is faced with a dike 2 feet wide at bottom, 16 inches at top, and 4 feet high, coped with stone or turf, and pointed with lime in front, and a beech, thorn, or privet hedge planted at the top. This fence costs about 8s. per rood of the above length, where the stones are not more than three-fourths of a mile distant.

Cleaning.—It ought also to be stated that, preparatory to planting, where the ground is covered with long and close heath, the latter is burned two or three years before operations are commenced, this time being necessary to allow the soil to regain sufficient firmness for the protection of the plants. In cases also where whins and broom are growing so thick as to choke any plants which may be put in, they are rooted wholly out or otherwise, according as firs or hardwood are to be planted; if they should afterwards spring up and appear to overgrow the plants, cutting should be resorted to, as digging would be injurious to the plants.

Methods of planting Larch and Scots Fir.—The soil best adapted for the Larch and Scots fir is a black or brown loam, upon a bottom of sharp sand or gravel and rock, but they are found to thrive in almost every soil, provided it is properly drained. Firs of this variety may grow in wet and marshy ground, but they invariably have a stunted and unhealthy appearance. The mode of planting these firs varies somewhat according to the ground. In soft open ground they are planted with a double-pointed dibble, at distances some-

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thing less, as already mentioned, than 3½ feet. In smooth and hard ground where the heath or grass is short, a small hand spade, from 15 to 18 inches long, is used; but if the ground be rough, and the heath and grass long, as is often the case where whins and broom have been cut, there is employed a common spade about half wood, and made sharp at the point, which for grubs of this kind is found a more expeditious instrument than any other.

Spruce, Silver, and other Firs.—The Spruce, Silver, and Balm of Gilead firs thrive best in damp ground, but it must be neither marshy nor have surface-water. The other firs which the reporter occasionally uses, as the white and black American Spruce and Weymouth Pine, he finds to thrive best in good black or brown loam. The mode of planting them all is the same as for larch and Scots fir, where they have not been more than two or three years transplanted; but they are frequently planted of greater age, in which case they are placed in pits, as the slits which are in other cases sufficient will then be too small to contain the roots.

It may here be remarked, that the use of the balm of Gilead fir has of late been entirely given up, as it does not thrive beyond the age of fifteen or twenty years, and can hardly attain maturity in this country.

Oak.—The soil which appears best adapted for the oak is a clay, or black or brown loam; but it thrives well either in strong mossy or light sandy soils, all of them, however, being first properly drained. In planting, pits 18 or 20 inches square, and 12 or 15 inches deep, are made. The surface turf taken off is cut through the middle, half of it placed in the bottom of the pit, and the other half broken down and placed round the roots, so that they may have the advantage of the best of the earth. It is of importance not to put the roots too deep, and the pits should not exceed the depth here mentioned.

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Other Hardwood.—The soil which is considered best adapted for ash, elm, and plane, is a strong black or brown loam, with a mortar bottom. Beech will thrive well in a lighter loam with a dry bottom. Alders and poplars are the best plants for wet grounds.

In planting the above varieties, and most other kinds of hardwood, nearly the method described for oaks has been followed. The method of planting hedge-rows, clumps and underwood, has already been described.

Expense of Planting.—The expense of planting waste lands consists of draining, fencing and cleaning the ground, the cost of plants, and the wages for planting them. The draining and cleaning of the ground vary of course according to its nature; the cost of fences has been already stated, and the price of the plants used by the reporter during the present and the previous five years, are given in the Table subjoined (No. I.). The planter's expense also vary according to the ground, and, of course, to the rate of wages. If the ground is not very rough, two men and two boys will plant, with fir alone, a Scotch acre per day; but if the ground be rough, it may take three men, and three boys. The mean expense at the present rate of wages is about 6s. 6d. If the plants are one-half fir and one-half hardwood, twelve men and six boys will plant an acre, if the ground is not rough; but if it is, eighteen men and nine boys will be required: the mean expense is about 22s. 2d.

During the years above stated, there have been paid out for draining land to be planted,

	£242	12	0
For fencing,	857	9	9
For cleaning,	55	10	0
For plants, as per Table No. I.,	1785	14	4
For planting,	616	15	0
In all,	£3578	11	4

and 1240 acres having been planted, the average per acre is L. 2 : 17 : 8.

During the years 1811 and 1824 and intervening years, the total expense of planting is, per Table, No. II. L. 5202, 19s. 1d., and 1968 acres having been planted, the average is about L. 2 : 12 : 10.

Management of Plantations.—It now only remains to state the mode of management of the woods, and as the reporter's statement has already extended to so great a length, this will be done in very few words.

Young Fir Plantations.—From every kind of firs all dead branches are removed, and as the plantation gets close, a few of the lower branches are cut off from the larch and Scots fir within two inches of the tree, and also some of the side branches, these last being cut to the first or second joint only to prevent them from bleeding. The spruce and other varieties of fir ought never to be pruned, as it both injures their growth and destroys their appearance. By being lopped in this way as occasion requires, the trees have sufficient room for some years longer, and when again too thick, the worst of the trees, of all varieties, are removed, until they appear to have sufficient space. For this process no specific rule or fixed time can be given; but if all the trees planted, as close as is the practice on these estates, have grown up equally, and with ordinary rapidity, every alternate tree should be removed perhaps from their eighth to their twelfth year.

Young Hardwood Plantations.—The oak, ash, elm and all other common kinds of hardwood, are first pruned in the nursery, when about two years transplanted; and on being removed to the plantations, in the way already stated. After being planted out two or three years, they are again pruned close to the tree with a knife. When any of them appear in an unhealthy state they are cut down, entirely,

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close to the ground. The operation is repeated regularly as the trees seem to require it.

It may, however, be observed, that in some cases it does not appear to be of any advantage to nurse the stem by lopping off every side branch. Some of these may be fully as valuable for husbandry and other purposes, as the stem itself, particularly if they seem to be more thriving; and in pruning this ought to be particularly attended to.

Old Plantations.—In thinning and pruning old plantations which have not been regularly attended to, it is conceived necessary to proceed with greater caution. To thin all at once a plantation of twenty or thirty years of age might have the worst effects from the cold to which the trees would necessarily be exposed, and for which they are not duly prepared; and to prune firs of that age would be a very dangerous experiment. In pruning old *hardwood*, the axe ought never to be used; the saw alone should be employed, and instead of cutting close to the tree, as in the case of wood which has been regularly pruned, the branches, particularly if large, ought not to be cut nearer than the first or second joint. From the experience of the present forester, he is inclined to recommend, for most cases, thinning of old wood instead of pruning, or, where pruning seems indispensable, the removal of dead wood and cross branches on the top alone.

CORTACHY CASTLE,
6th November 1830.

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TABLE I. SHOWING THE NUMBER AND KIND OF PLANTS USED IN EACH YEAR ON THE AIRLIE ESTATES; THEIR PRICES, AND TOTAL EXPENSE, DURING THE YEARS 1825, 1830, AND INTERVENING YEARS.

	1825.		1826.		1827.		1828.		1829.		1830.		Total Numbers.	Amount Paid.
	Price.	Number.	Price.	Number.	Price.	Number.	Price.	Number.	Price.	Number.	Price.	Number.		
Larch,	4/6 p T	770,000	5/ p T	450,000	5/ p T	650,000	4/ p T	650,000	3/6 p T	570,000	3/6 p T	430,000	3,520,000	£753 5 0
Scots Fir,	4/6 p T	175,000	4/6 p T	250,000	5/ p T	270,000	4/6 p T	300,000	4/ p T	490,000	4/ p T	100,000	1,585,000	348 12 6
Spruce,	8/6 p T	10,500	10/ p T	10,000	12/ p T	8,500	10/ p T	19,000	10/ p T	8,800	8/ p T	12,000	68,800	33 5 3
White American,	4/ p H	500	3/ p H	100	3/ p H	100	2/6 p H	50	3/ p H	50	3/ p H	200	1,000	1 14 9
Black ditto,	5/ p H	100	8/ p H	25	5/ p H	50	5/ p H	50	5/ p H	25	5/ p H	25	275	0 14 6
Silver Fir,	2/ p H	1,500	1/6 p H	300	12/ p T	500	12/ p T	2,500	2/ p H	300	1/6 p H	300	5,400	4 1 0
Weymouth Pine,	3/ p H	100	4/ p H	50	5/ p H	50	6/ p H	100	5/ p H	25	5/ p H	20	345	0 14 9
Pinasters,	4/ p H	50	10/ p H	20	10/ p H	20	...	...	...	...	10/ p H	10	100	0 7 0
Oak, of sorts,	40/ p T	21,500	30/ p T	30,000	40/ p T	10,000	35/ p T	58,500	25/ p T	17,200	25/ p T	12,000	149,200	246 17 6
Elm,	30/ p T	4,350	20/ p T	6,500	30/ p T	3,000	2/6 p H	8,800	15/ p T	3,000	20/ p T	1,500	27,150	32 5 6
Ash,	30/ p T	10,350	25/ p H	20,000	30/ p T	2,000	25/ p T	24,300	25/ p T	13,000	15/ p T	9,000	78,650	96 18 0
Mountain Ash,	1/6 p H	350	2/ p H	300	2/ p H	600	10/ p T	1,000	2/ p H	300	2/ p H	300	2,850	2 5 3
Plane or Sycamore,	30/ p T	3,200	30/ p T	5,000	25/ p T	5,500	25/ p T	3,500	20/ p T	2,000	20/ p T	3,500	22,700	29 1 0
Beech,	15/ p T	4,850	15/ p T	8,500	1/ p H	200	15/ p T	4,300	12/ p T	3,000	15/ p T	2,000	22,850	16 12 9
Laburnum,	2/ p H	300	2/ p H	350	2/ p H	700	12/ p T	5,000	2/ p H	300	1/6 p H	550	7,200	5 1 3
Service Berry,	5/ p H	150	4/ p H	50	4/ p H	50	...	...	3/ p H	100	5/ p H	25	375	0 15 9
Poplars, of sorts,	1/ p H	500	10/ p T	3,000	12/ p T	3,000	10/ p T	1,500	1/6 p H	550	10/ p T	2,000	10,550	5 14 3
Maple, of sorts,	4/ p H	50	10/ p T	25	3/ p H	200	3/ p H	25	4/ p H	20	5/ p H	25	345	0 13 3
Lime, of sorts,	5/ p H	20	3/ p H	100	5/ p H	50	2/ p H	150	5/ p H	35	...	...	355	0 11 3
Horse Chestnut,	6/ p H	250	5/ p H	100	4/ p H	700	4/ p H	400	3/ p H	500	3/ p H	500	2,450	4 14 0
Sweet ditto,	10/ p H	200	6/ p H	50	5/ p H	250	6/ p H	50	4/ p H	250	5/ p H	100	900	2 13 6
Birch,	10/ p T	1,200	12/ p T	1,000	8/ p T	3,500	1/ p H	60	8/ p T	1,500	10/ p T	1,000	8,250	3 14 6
Weeping ditto,	...	...	3/ p H	300	5/ p H	150	2/6 p H	25	1/6 p H	50	...	...	525	0 17 10
Alder,	10/ p T	2,500	10/ p T	5,500	9/ p T	5,500	10/ p T	3,400	10/ p T	4,000	12/ p T	1,500	22,400	11 1 6
Ornamental Trees,	50/ p H	50	50/ p H	150	75/ p H	250	50/ p H	250	50/ p H	150	25/ p H	150	1,000	26 5 0
Shrubs, of sorts,	50/ p H	750	75/ p H	450	75/ p H	1,300	50/ p H	850	50/ p H	550	50/ p H	1,500	5,400	156 17 6
		1008,320		791,870		966,170		1083,800		1115,705		578,205	5,544,070	£1785 14 4

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TABLE II. SHEWING GENERALLY THE NUMBER AND KIND OF PLANTS USED IN EACH YEAR ON THE ESTATES OF AIRLIE, THEIR PRICES, AND TOTAL EXPENSE, DURING THE YEARS 1811 AND 1824, AND INTERVENING YEARS.

	1811.		1812.		1813.		1814.		1815.		1816.		1817.		Total Numbers.	Amount Paid.		
	Price.	Number.	Price.	Number.	Price.	Number.	Price.	Number.	Price.	Number.	Price.	Number.	Price.	Number.		£	s.	d.
Larch,—																		
1 year transpl.	8/6 T	288,000	9/ T	209,000	6/ T	100,000	7/ T	50,000	6/6 T	360,000	16/ T	300,000	6/ T	400,000	[illegible]	—		
2 years transpl.	15/ T	200,000	12/ T	100,000	...	...	...	...	...	...	...	...	...	...	[illegible]	—		
Spruce,—																		
3 years transpl.	8/ T	5,000	50/ T	5,000	...	...	12/ T	4,000	15/ T	3,000	10/ T	20,000	—	...	[illegible]	0	—	
Do. and other Firs,	...	...	...	...	...	...	...	...	...	...	...	...	...	100	[illegible]	0	—	
Hard wood, of sorts,																		
3 years transpl.	60/ T	4,000	10/ T	3,000	...	...	50/ T	3,000	50/ T	1,000	40/ T	15,000	30/ T	20,000	[illegible]	0	—	
Scots Fir,—																		
1 year transpl.	...	...	7/ T	138,000	...	...	6/ T	10,000	5/6 T	184,000	15/ T	200,000	5/ T	200,000	[illegible]	0	—	
Shrubs, Ornamental Trees, &c.	...	...	...	...	...	...	75/ H	150	...	...	75/ T	250	75/ H	250	[illegible]	0	—	
		447,000		447,000		100,000		67,150		448,000		535,250		629,400	[illegible]	35		
	1818.		1819.		1820.		1821.		1822.		1823.		1824.					
Larch,—																		
1 year transpl.	5/6 T	700,000	5/ T	800,000	5/ T	400,000	4/6 T	600,000	4/6 T	400,000	4/6 T	400,000	4/6 T	650,000	5,798,000	1486	18	0
2 years transpl.	...	...	...	...	...	...	...	...	...	...	...	...	...	...		210	0	0
Spruce,—																		
3 years transpl.	10/ T	5,000	9/ T	30,000	9/ T	20,000	8/ T	14,300	8/ T	20,000	8/ T	30,000	8/ T	12,000	170,400	78	9	0
Do. and other Firs,	...	...	...	...	...	...	...	...	...	...	...	...	...	...				
Hard wood, of sorts,																		
3 years transpl.	30/ T	15,000	25/ T	23,000	25/ T	40,000	30/ T	37,000	25/ T	60,000	25/ T	40,000	25/ T	35,000	295,000	412	10	0
Scots Fir,—																		
1 year transpl.	5/ T	333,000	4/6 T	300,000	4/6 T	200,000	4/ T	300,000	4/6 T	200,000	4/ T	200,000	4/ T	250,000	2,215,000	567	13	0
Shrubs, Ornamental Trees, &c.	...	...	50/ H	1,300	50/ H	7,000	50/ H	5,400	...	...	50/ H	500	50/ H	2,200	17,100	278	15	0
		1053,000		1154,300		667,000		956,700		680,000		670,500		949,200	8,795,500	3054	5	0

ABSTRACT OF TABLE I.

The Amount paid for Plants, as per Table I. is					L. 1785	14	4
To which add Expense of Draining, . .	L. 243	12	0				
Fencing, . .	857	0	0				
Cleaning, . .	75	10	0				
Planting, . .	616	15	0				
					1792	17	0
TOTAL EXPENSE,					L. 3578	11	4

ABSTRACT OF TABLE II.

The Amount paid for Plants, as Table II, is					L. 3054	5	0
To which add Expense of Draining, . .	L. 305	17	2				
Fencing, . .	959	14	0				
Cleaning, . .	121	7	6				
Draining, . .	761	16	3				
					2148	14	11
TOTAL EXPENSE,					L. 5202	19	11

COMMUNICATION RESPECTING DISEASES IN TURNIPS. *In a letter to the Depute-Secretary. By the Reverend Mr* JAMES FARQUHARSON, *of Alford Parish, Aberdeenshire.*

I LAST year sent to the Highland Society a report on the disease in turnips called Fingers and Toes, the greater part of which has been printed in the Society's Transactions, vol. viii. p. 233, *et seq.* It is there followed by reports on the same subject by Mr John Abbay and Mr M. Birnie.

The discrepancy of opinions and conclusions contained in these several papers is such as to involve the question in mystery; and since I became aware of it, I have, during the course of the present season, endeavoured to ascertain its source. Believing that I am now fortunately enabled to throw considerable light on the subject, I transmit this additional report for the consideration of the Society.

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I had concluded, from several circumstances which occurred in the course of my own practice, that unfermented dung is the cause of the disease (p. 236.) In this present season I have made a direct experiment with unfermented dung, obtained from sheep, as formerly described (pp. 233, 234), on two very different soils, the one a wettish and retentive yellow clay, in a recently reclaimed piece of poor land, the other a dry friable deep black mould. A cart-load of the unfermented dung was put in part of four drills of the former, which were sown with turnips on the 10th June; and another load of the same in part of five drills of the latter, which were sown on the 19th June. The turnips, in both cases, were the yellow variety.

The result has been attentively watched, and has proved highly injurious in both cases, especially on the dry land, although not so extensively ruinous as in that of 1818, formerly reported. I cannot find better terms to express the present appearance of the disease than those formerly employed: "The roots, instead of forming bulbs in the usual way, are found to be split into numerous scariose and diseased radicles, of very irregular and grotesque forms, and generally tinged with a dirty blue colour; a large part of the circumference of each radicle generally wants the natural skin, and many of them want it altogether, appearing cancerous and rotten over their whole surface."

The disease, at its first appearance, about the beginning of August, consisted of simple fissures across the bottom of the incipient bulb, or caulescent depressed part of the root. These fissures have since enlarged by degrees, becoming in the end cancerous on their raw surfaces, and eating, as it were, upwards into the substance of the bulb.

In the field where the experiment was made, there are 4½ acres manured with fermented dung, and 2 acres with bone dust, at the rate of 30 bushels per acre. No diseased turnips are found any where excepting where the unfermented dung

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was used. Many turnips are indeed found having vertical fissures on their sides, but these always show a tendency to heal, and are at last, for the most part, covered with a new epidermis. The carious fissures are only found in the two small patches of the experiment.

The experience of Mr Birnie (pp. 241, 242) led him to infer that very wet manure produced the disease. The discrepancy between this opinion and that which I had announced becomes more apparent than real, when we reflect that excess of moisture impedes, or even quite prevents, putrescent fermentation. The unfermented dung employed this year in the above experiment was not universally wet, a large proportion of litter having been spread in the sheep cot.

The result, indeed, which he obtained with one of the manures which he employed might seem, without a reference to the other experiments, to indicate that much moisture is the cause of the disease, rather than want of fermentation. Coal-ashes, a substance which we cannot conceive liable to the putrescent fermentation, were equally hurtful with other manures, when kept and applied wet. But then he speaks of them as being mixed with "other refuse," and therefore the argument that might be drawn from them is not conclusive.

The remote cause, the appearances, and the probable remedy of the disease, which I had formerly reported on, appear thus confirmed by new and direct experiment.

But on reading the preface to the reports (p. 232.), and the report of Mr Abbay (pp. 238, *et seq.*), it became at once apparent that a disease of a different character was referred to in both papers. The writer of the preface says: "The incipient state of the disease is described as consisting of small knobs or tubercles, which are attributed to the puncture of insects, and in which eggs or larvæ are usually found," &c. "In the more developed state of the disease the tap-root has been destroyed, and excrescences or subsidiary roots, resembling digitations, have spread out in different parts. The

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bulb becomes altered in its structure and qualities, and finally putrefies." Mr Abbay says, "Before the plants are a month old,.....the canker will be seen begun at the tap-root. In a short time it eats through the root, and cuts off the fibres below. When the plant is left in this enfeebled state it exerts itself for life, by throwing out side fibres above the cankered part; and then, according to the richness of the land, the turnip shows more or less top, but never a well-formed bulb. If the land is poor, the plants die off; but I have had them continue vigorous in their top through the month of July, while the root was running into all shapes, like potatoes."

Accident has brought under my notice, during the present season, a very remarkable instance of disease, having the above characters, and attended with circumstances which, I conceive, throw some light on it, and lead to probable remedies. In particular, they will, as we shall see in the sequel, go far to establish the efficacy of that proposed and employed by Mr Abbay. I shall probably be best understood by giving first a brief historical detail of my observations.

On the 20th of August last, as I was passing near the place, I was requested by the wife of one of my labourers, who possesses a small croft, to look at her turnips, which she was then hoeing, and which, she said, were diseased in a way that she had never witnessed before, although she had been a regular hoer of turnips for upwards of twenty years.

On examining them, I perceived immediately that I had before me a specimen of a disease, which I was at the time very desirous of seeing. Many of the turnips, then about the size of hen's eggs, had entirely lost their tap-root and small radicles, the epidermis of the bulb had disappeared, and the shell, or firm peel immediately under it, was slightly honeycombed all over. As the weather had been very rainy, and the ground at the time was wet, these, notwithstanding the injury they had suffered, yet preserved their tops green;

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but tumbled out of the ground at the slightest touch of the hoe: all in this diseased state soon afterwards died. Others of the turnips had lost only part of their radicles; and others, and that the greater number, had enlargements of irregular forms, very much like potatoes, attached to them in various ways; in some cases a single excrescence, as large as the bulb itself, attached to it below; in others, a series of smaller ones, like beads, on the tap-root, or on the side radicles; and in others, again, many large and small excrescences attached directly to the sides of the bulb. More than half the crop had these appearances; but several turnips, dispersed promiscuously among the diseased, were quite sound.

I endeavoured to ascertain the presence of insects or larvæ in the diseased turnips, by cutting them into thin slices, and examining them with the aid of a strong lens; but at this time I found none. In most of the unnatural excrescences, however, there was discovered a minute tortuous perforation, with dark-coloured walls, enlarging a little from the lower part or centre, upwards or outwards, as if a minute insect, gradually growing in size as it advanced, had eaten its way to the outside. No perforations were found in the bulbs.

The point to be next ascertained was the extent to which the disease prevailed in the turnips, which occupied a small rectangular piece of ground, of about 50 Scotch falls. It was found, on a minute examination, that the disease was confined to a space of about 12 falls at one end of this, and that the diseased bounded with the sound turnips at a straight line across, and somewhat oblique to the drills.

The history of the former management of the land, which I partly know by personal observation, and have more fully ascertained by inquiry of the possessors, is this: It was uncultivated previous to 1826, and formed a somewhat swampy pasture, occupied chiefly by various rough grasses, and some rushes and carices. Having been laid dry by draining, it was ploughed in the autumn of 1826, and cross-ploughed in

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1827. In 1828 the small part, where the diseased turnips now are, was sown with turnips, and the part having the sound turnips with oats. In 1829 both parts bore a crop of oats.

The remote cause of the disease thus becomes at once manifest. It can be nothing else than the circumstance that the land has borne a crop of turnips only two years before. At first, indeed, a suspicion was naturally entertained that it was the recently uncultivated state of the land, as this would have agreed with the experience of Mr Abbay, of the prevalence of the disease in land brought only recently into cultivation (pp. 238, 239.); but the part of the land, which had not formerly borne turnips being free from the disease, although equally recently cultivated, puts an end to that suspicion.

Since the 20th August I have taken many opportunities to examine more particularly into the immediate cause of the disease. On the 26th August I was accompanied by Dr Alexander Murray, who also examined the matter attentively, and will give his testimony to the destructive nature of the disease, and to its being confined to the piece of land which was under turnips in 1828. We failed at this time likewise to discover any insects, or their larvæ, within the body of the turnips, or their diseased excrescences, it being then doubtless not at the proper stage of the insect's life for doing so; for the minute perforations in the diseased parts could leave no doubt of their former presence*.

Some time after this, however, I succeeded in detecting two small insects, of appearances differing from each other, penetrating the turnips from the outside, and one of them going on to bury itself within the bulb. One of them, which I have found in fewer numbers than the other, but more frequently perfo-

* Dr Murray carried away for further examination specimens both of the sound and diseased turnips; and afterwards wrote me that he had found insects upon the latter, but not in the former.

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rating the turnips, and of which all the individuals I have observed were nearly of the same size (about one-fourth of an inch in length), has a linear, somewhat depressed body, with six jointed short black feet on its anterior part. The length is equal to six or seven times the breadth of the body. It has very short, somewhat clavate, antennæ, their length equal to not more than half the breadth of the body. The general colour is a pale grey. The abdominal rings, which are eight, have each two semicircular spots of a bright brown on the back, and lunated spots of the same brown towards the sides. There are two somewhat divergent short tapering setæ, bearing short lateral branches, at the hinder extremity; and two very short tapering setæ at each side of each abdominal ring.

Although it has thus so many characters of a perfect insect, it has yet no wings; and, notwithstanding its jointed feet, its motions are sluggish and vermicular.

This insect, at the present date (October 14th), is now found in considerable numbers in such of the diseased turnips as have survived, imbedded immediately under the peel.

The other insect, which I have also found, although not frequently, in the act of penetrating the turnip from the outside, is a round obscurely ringed worm, without any perceptible feet, of a dirty white, and somewhat translucent. The head is black, armed with two minute black hooks, by the aid of which it firmly attaches itself to the turnip. Two dark branches or prongs, a little divergent, appear as extensions from the black head, entering some distance into the translucent body.

At the present date (October 14th), this latter insect is now scarcely to be found; but at an earlier period it was found of all sizes, from about 3-8ths to 1-40th of an inch in length, either attached to the deseased turnips, chiefly towards evening, or in the contiguous soil, and in sufficient numbers to account for the loss of the tap-root, radicles, and epidermis and the honeycombed state of the peel. It appears from the

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result of their depredations on the plant, that the peel of the bulb, and not the softer and sweeter internal part, forms their favourite food; and as the tap-root and radicles consist principally of an extension of the peel, these are almost wholly eaten through, and so perish. It is even probable, according to the experience of Mr Abbay (p. 239), that these are the parts first attacked. The circumstance that I have seen these insects attached to the bulb chiefly in the evening, shows that they naturally shun the light; and this again leads to the inference that they make their first depredations on the parts most deeply buried in the soil.

In regard to the knots and tubercles, or diseased excrescences, the perforations often found in them show that they also are to be ascribed to the action of the insects, although we cannot so well explain the nature of their progress. They were apparently in an advanced stage before I saw the disease; and their origin was therefore probably connected with the depositing or hatching of the eggs which produced the after numerous broods. The eggs I have failed to discover.

Part of the preternatural growth of knobs may indeed be accounted for in the terms of Mr Abbay. "When the plant is left in an enfeebled state, by the loss of some of its fibres, it exerts itself for life, by throwing out side radicles above the cankered part," (p. 240). But we ought to recollect that the attacks of insects on other plants are, in many instances, well known to produce enlargments, and even the growth of substances very unlike any part of the natural vegetation, in a manner that we are yet unable to explain; as, for instance, in the cases of the nutgalls of the oaks, and the balls in the leaves of some of the willows. Something similar to this may occur in the turnip; for in those cases where the insects have been found penetrating the turnip from the outside, there has often been seen a swelling, like an incipient knob, contiguous to or surrounding the perforation, although remote from any radicle.

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Want of practice in such investigations has made me decline inquiring into the metamorphoses of the two insects, or whether the one is the larva of the other.

Having now described the appearances of the disease, and pointed out both the remote and immediate causes, we may proceed to the investigation of the means of prevention, indicated by the peculiar circumstances under which it has occurred. In this we shall receive much aid from the preface referred to, and Mr Abbay's report.

The patch of land where the disease has occurred here corresponds with that in which it was found most frequently in Mr Abbay's practice, in the circumstance that the land in both instances had been brought only recently into cultivation. Here the land had been only four years ago ploughed from its state of nature. In Mr Abbay's experience, the disease was most prevalent in those places where old hedges had been recently stubbed out, or that had long remained for headlands and boundaries in grass, and in the lands that had been open pasture and commons (pp. 238, 239). He adds, that the part that had been old tillage was never more than partially affected.

The inference evidently to be drawn from all this is, that the races of the insects had existed in some considerable numbers in the soil before cultivation.

But, by attending to other coincidences in the several cases, we find that the insects do not yet exist in sufficient numbers to be very injurious, until after their multiplication has been encouraged by an abundance of a favourite food, with which a crop of turnips supplies them; for the disease here is confined to the part which bore turnips in 1828, and does not extend to the other part, which never bore turnips, but has been as recently cultivated as the other; and Mr Abbay says, it was only after the open pastures and commons had been ploughed eight or twelve years, that is, had borne two or three crops of turnips, the turnips of his rotation being re-

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peated every fourth year, that the disease occupied the whole surface.

We thus arrive at the conclusion, that a repetition of turnips, at such intervals, occasions a destructive multiplication of the insects, where the race already partially exists in the soil. In confirmation of this, I may state a fact which I know from repeated experience, that the colewort, a species closely allied to the turnip, liable also to be attacked by an insect, resembling if not identical with the worm of a dirty white above described, generally suffers most by the attacks when planted in ground that bore coleworts the previous year.

The greater injury in the recently improved land, may perhaps be accounted for by the better protection the insects, or their larvæ or eggs, enjoy during winter in the turfy unreduced soil, which, according to the nature of the plants which previously occupied the surface, continues often for many years loose and spongy, and less liable to be penetrated by the frost than land long cultivated.

The remedy employed by Mr Abbay in his own case successfully, and to which he was led by an attentive observation of an incident that occurred in his own practice, appears by an induction from the above particulars to be a proper one,—namely, the introduction of a clean effective fallow occasionally, in place of a turnip crop. This, by destroying all pabulum furnished by live vegetables, cuts off from the particular field the whole generation of insects; by postponing the introduction of that crop which most encourages their multiplication, prevents the rapid increase of any that might be again carried into it; and by reducing all turfiness and consolidating the soil, deprives them of a protecting covering from the severity of the winter. Mr Abbay's is at least one instance of its efficacy.

In the introduction it is, however, stated (p. 233), "that in the principal districts of Scotland, where this disease most prevails, it has not yielded to any of the numerous remedies

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proposed," including of course fallowing among the rest. The following observations in relation to it can be held no more than conjectural respecting the probable cause of failure, and perhaps as pointing at paths by which we may arrive at a finally satisfactory result in our inquiries.

It appears, from what has been stated above, that there are two diseases of the turnip, which, as their most obvious symptoms are somewhat similar, consisting, in the one, of ruptured parts,—in the other, of excrescences below the ground, may be liable to be confounded, till after a narrow inspection. These having different origins, have also different remedies; and the reported inefficacy of fallowing, may, in some instances, have arisen from its being employed against the injury which arises from unfermented dung; and, on the other hand, the fermenting of the manure may have been employed against the disease created by the insects. In either case there would be a failure.

In regard to the insects, we may extend our observations much farther. It would be very desirable to ascertain on what particular plants they subsist, independently of our artificial crops of turnips. Of the different species of insects, many, although having particular favourites, which they prefer, are yet known to have a considerable range of plants, on which they can subsist, still bounded by certain limits. The silk-worm, for instance, whose favourite is the mulberry, feeds, in the hands of some of the curious among us, on the leaves of the garden-lettuce. The gooseberry and the red currant have each their peculiar caterpillar; but that of the latter, when it has eaten all the leaves of that plant, will betake itself to the neighbouring gooseberry, shunning the apple or pear, which were equally accessible to it. It were needless to multiply instances.

We are entitled to infer, from the great multiplication of the insects on the turnips, that these furnish them with a favourite food. The part in which, as their depredations show,

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they chiefly delight, is the peel, or firm coriaceous substance which incloses the bulb, and forms the chief part of the tap root and radicles. The family of the cruciferous plants, of which the turnip is a species, are all more or less furnished with a pungent essential oil, which is peculiar to them; and the strong pungency of the turnip-peel proves that this oil resides in it in larger quantity than in any other part of the unseeded plant. The circumstance of the insect preferring this part, may lead us to the inference, that other plants, containing the same oil, can also supply it with a favourite nourishment.

With these views I have examined the uncultivated ground which bounds the patch of diseased turnips on two sides; but excepting the Lady's Smock (*Cardamine pratensis*), which grows there in some profusion, I have found none of the cruciferous family. I might have been more successful in an earlier period of the season.

If we inquire, however, on what plants the insects can subsist, in lands under cultivation, during the years intermediate between the turnip crops, we can immediately, if the above views have any accuracy, refer to two species, one or other of which, and sometimes both, are only too abundant in all the best and richest turnip soils of Scotland, and which, owing to the abundance of their seeds, the quickness with which they come to perfection, and the faculty which they possess of preserving their vegetating power perfect for years, when buried a certain depth in the earth, are exceedingly difficult of extirpation;—these are the *Sinapis arvensis* (Wild Mustard, or Charlock), and *Raphanus Raphanistrum* (Wild Radish, or Jointed Charlock,) of Hooker's Flora Scotica. Both possess the peculiar oil of the family in great abundance, if we may judge from their pungency. Of these, one or other is rarely absent from our dry fields during any of the years of such a rotation as Mr Abbay has adopted,—that is, turnip, barley, clover, wheat; for even

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amongst the clover some plants are found from the seeds of those among the barley of the preceding year.

When the land is in fallow, the cultivator delights to get the seeds of these plants to grow as the only means of destroying them; and as they are only annuals, he often allows the plants to approach or get into the flowering state, before he ploughs them down. In the mean time, a new generation of insects may be matured at their roots, and so the fallow, if not kept constantly clean, may not only fail in checking the brood of insects, but even become the means of increasing it.

Another remedy may be learnt, from an observation of the order of cultivation in those districts where the disease of the insects rarely occurs. Such a district is the one in which I reside. The instance of it, which I have above described, is the only one I have seen, or can hear of on inquiry. Our general rotation of crops is one of seven years; of which three in succession are grass, the first generally cut, and the other two pastured, one always turnips.

There are a few of our generally best cultivated small farms cropped in a shift of five years, of which two in succession are grass, the first cut, and the second pastured. I am intimate with several of the possessors of these, and have never learnt that the turnips, which are always grown one of the years, have in any case suffered from insects *. It thus appears that one additional year in pasture-grass is an effective remedy, or at least a preventive.

ALFORD, 14*th October* 1830.

Since writing the above, I had yesterday an opportunity of examining the wild radish or jointed charlock, on a fallow headland in a turnip-field. The plants were only just

* If they do suffer, it is at most in numbers so few as never to attract notice.

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getting into the flowering state, and could have no chance for perfecting their seeds at this late period of the year; and so, in that view, their existence on the land might be safely despised by the cultivator.

Among a great number of plants, I found a few attacked by the round worm with the black head above described; and in more than one instance caught the insect attached to the epidermis of the root. The disease produced in consequence has the general aspect of that in the turnips; only the excrescences are smaller, proportional to the less size of the plant; but there is a similar destruction of radicles, and of part of the epidermis of the fusiform root. In one instance, the fusiform root was entirely cut off about an inch below the stem, and the plant derived its nourishment from a number of radicles spreading under the surface of the ground.

Thus the conjecture, that this plant may be the means of continuing the brood of insects, is converted into a certainty, so far as regards at least one species.

It is true, I have discovered only a few, out of many plants, attacked; but then it must be attended to, that, under our system of rotation, the turnips also are generally free from the insects. In a more infected ground, like that described by Mr Abbay, it is more than probable a greater proportion of the charlock plants would have broods, as takes place there with the turnips.

On one of the diseased charlock plants I discovered an insect different from those described. It is small (about 1-20th of an inch long), having a linear depressed body, of a snow-white, with six articulated short brown feet on its anterior part, and large clavate antennæ of the same colour with the body. It is nimble in its motions, and I could not perceive wings. I had seen a few of the same insect in the soil round the diseased turnips; but as they could not be traced attacking the turnips, they were neglected. Their being found on the allied plant, implies that they deserve attention in this in-

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quiry. The excrescences may prove to be the nidus of one insect, and the destruction of the radicles and epidermis the work chiefly of another.

These questions deserve a very careful inquiry. In the mean time, it is hoped, considerable light has been thrown on the circumstances under which the injurious multiplication of the insects takes place, guiding to the means of prevention and remedy.

ON THE HOPETOUN OAT. *By Mr* PATRICK SHIRREFF, *Farmer, Mungoswells, East Lothian.*

[For the following Report on a new variety of Oat, communicated in consequence of the annual premium offered by the Society for the introduction of any new species or variety of useful plant into the field culture of Scotland, the Society's Silver Medal has been adjudged to the author.]

IN the present circumstances of Britain, when the fruits of her soil do not maintain the population, an increase of agricultural produce is a national desideratum. Without attempting to point out the modes by which this object might be attained, I shall simply show the probable effects of an improvement in the vegetables cultivated, by taking the wheat as an example.

The number of fertile joints in a spike of wheat is about fourteen. If a variety could be found with two additional fertile joints in the spike, and in other respects equal to the varieties at present cultivated, the supply of grain thereby furnished would be equal to one-sixth of the present produce, the new variety not requiring more seed, and the present increase being supposed to be seven-fold. Could a second variety be obtained, having the additional fertile joints, and having the size of the grains increased in like proportion, the

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supply of food would be increased by about one-third of the present produce. These calculations will appear not altogether visionary, when we compare some of our vegetables in their present improved state, with the same species as grown a hundred years ago. In fact, all our cultivated plants are still susceptible of improvement; and, as an example, I shall state some facts respecting a variety of them, named the Hopetoun Oat.

Having frequently had occasion to pass the gateway of a field bearing a crop of potato-oats, in the summer of 1824, a stalk of remarkable height attracted my attention. When the crop was reaped, the grains supported by this stalk, and those upon a short one proceeding from the same root, were gathered, and in the following spring were included in a collection of oats obtained during a tour in some English districts, and sown with a view to ascertain their respective peculiarities. The crop from the grains of the gigantic stalk was again conspicuously tall. The following year, 1826, was particularly unfavourable to the growth of the oat in East Lothian, which circumstance, joined to that of the crop of the tall oat having been partly eaten by mice, prevented an increase of quantity; and it was not until the crop of 1827 was reaped, that the new variety established its superiority. In 1828, a sample of the Hopetoun oat, and magnificent specimens of the plant, were exhibited at the Highland Society's agricultural show at Glasgow. About the same time a bushel of the seed was presented to Robert Wallace, Esq. of Kelly. In the spring of 1830, the oat was offered to the public, and sold to forty-three individuals, and in the autumn of 1830 it was sent to foreign countries.

Feeling a lively interest in the fate of a plant, named as a tribute to the memory of one of the most amiable characters of modern times, and which had engaged my attention on account of its intrinsic merits, I circulated queries respecting it amongst the individuals who had purchased seed, and

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also requested information through the medium of the North British Advertiser. If my success has been limited, the ungenial nature of the season, the early period at which the information was desired, and the circumstance of the crops having been kept unthrashed for seed, in consequence of the estimation in which the plant has been held, sufficiently account for the small number of details which I have to offer.

1st, Experiment made at Kingcausie, Aberdeenshire, and reported by John Boswell, Esq. Balmuto.

Two bolls of oats were sown on the 24th March 1830, the one potato-oats grown at Balmuto, the other Hopetoun oats grown at Mungoswells. The Hopetoun oat came up ten days before the other, and was much thicker in the braird. Severe weather having come on, the potato oat lost colour and looked very ill, but the Hopetoun oat retained a healthy appearance, and was not touched by the worm or grub, which cut up the other dreadfully. The Hopetoun oat came first into ear, and was better ripened when cut down. Both kinds were very much damaged by the rains and winds; but the Hopetoun oat resisted the weather longer than the other. The oats were grown on a good, free, black soil, more inclining to sand than clay. There was a shade of difference in the ground, in favour of that in which the potato oats grew. Provost Fraser, for many years the greatest corn-merchant in Aberdeen, considered the quality of the Hopetoun oat 3s. per quarter better than the potato oat. The following is a tabular representation of the experiment, per imperial acre, the weight and measure imperial standard.:

	Hopetoun.	Potato.	Difference.	In favour of
Time of reaping	27th Sept.	27th Sept.		
Time of thrashing	6th Oct.	6th Oct.		
Good grain	49 bush.	48 bush.	1 bush.	Hopetoun.
Weight of do.	42 lb. 10½ oz. ℔ b.	42 lb. 10½ oz. ℔ b.		
Inferior grain	433 lb.	383 lb.	40 lb.	Hopetoun.
Weight of straw	277 st.	241 st.	36 st.	Hopetoun.

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2d Experiment, made at Haughland Farm near Elgin, by Mr Isaac Forsyth, and reported to the Morayshire Farmer Club.

Mr Forsyth procured from me two and a half quarters of seed, which he sowed on a rich loam, after one year's grass. On the same field, a parcel of late Angus oats was sown, for the purpose of instituting a comparative trial. Nothing appeared deserving of remark, until towards harvest, when it was very obvious that the Angus oat, though greener, and not so far advanced in the ripening process, was sooner and more severely affected by the boisterous wet season than the Hopetoun. During the interval of shearing the two kinds, a tempestuous wind occurred on the 20th September; and it appeared to all persons of experience who examined the field, that a full seed of the Angus oat had been shed by the wind. The Hopetoun oat was cut perfectly ripe; but, from the unsettled state of the weather, and the lateness of the season, the Angus oat was cut greener than otherwise would have been done. An equal quantity of land under each kind of grain, was accurately measured off, yielding the same number of stooks, which were separately stacked and thrashed. The difference which appears in the produce of straw may in part be accounted for by the Hopetoun oat being thinner and finer in the seed, and being riper when cut than the Angus oat, and the straw of the latter when thrashed felt colder and damper in the hand.

Mr Forsyth, in a communication subsequently addressed to me, says: "I have been a farmer for twenty-two years; and, in that time, have made oatmeal for my family forty-four times; but they and myself are of opinion we never had before meal of so much sweetness, richness, dryness, or fineness of colour, as what we are now using from your oat."

The following Table represents the results of Mr Forsyth's

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experiment per imperial acre, an allowance of a seed being made on account of the shake sustained by the Angus oat.

	Hopetoun.	Angus.	Difference.	In favour of
Time of reaping,	14th Sept.	27th Sept.	13 Days.	Hopetoun.
Time of thrashing,	30th Oct.	30th Oct.		
Quantity of grain,	66⅞ bushels.	56½ bushels.	9⅜ bush.	Hopetoun.
Meal per bushel,	28 lb. 14 oz.	27 lb. 4 oz.	1 lb. 10 oz.	Hopetoun.
Straw, ...	225½ stones.	290 stones.	64½ stones.	Angus.

3d Experiment, made at Traprain, East Lothian, by Mr Andrew Howden.

The field chosen for this experiment measures twenty-two Scotch acres. The soil is rather heavy, with a northerly exposure. In this field, four varieties of oats were sown. The Hopetoun, the grey Angus, the potato, and the early Angus. On the 19th and 20th of March, the whole field was sown at the rate of four bushels per Scotch acre of each kind, upon the several lots. All of them made a good braird, but the Hopetoun oat was strongest, and throughout exhibited a more vigorous and healthy appearance. Two portions were laid off, one of the Hopetoun, the other of the grey Angus oat, where the land seemed equal. Both portions were cut by the same reapers.

The following Table represents the results of Mr Howden's experiment, per imperial acre.

	Hopetoun.	Angus.	Difference.	In favour of
Time of reaping,	Sept. 13.	Sept. 25.	12 Days.	Hopetoun.
Time of thrashing,	Oct. 5.	Oct. 7.		
Quantity of good grain, . . .	b. lb. oz. 55 34 0	b. lb. oz. 49 16	b. lb. oz. 6 18 nearly	Hopetoun.
Weight of grain per bushel, . .	43 4	42	1 4	Hopetoun.
Ditto of meal, do.,	27 1½	25 15	1 2½	Hopetoun.
Quantity of inferior grain, .	7 4 13½	12 27 10	5 22 12½	Angus.
Weight of ditto,	41 10½ per b.	39 8	2 2½	Hopetoun.
Weight of straw,	301 stones.	322 st. 5 lb.	21 st. 5 lb.	Angus.

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Statements have also been transmitted by Mr Archibald Gorrie, Annat Garden, Perthshire; James Dennistoun, Esq. Camis Eshan, by Dumbarton; and William Storrie, Esq. Falkirk.

Mr Gorrie's statement is to the following effect. He had a bushel of the Hopetoun oat sown on strong black loam soil, at Annat Park, after clover. In the same field were sown the Drummond and Angus oats. All were equally infected with the disease called *Sedgeroot* and *Tulip-root*. The few patches of the Hopetoun oat that escaped appeared to carry a better filled panicle than the other oats similarly situated, and showed from 12 to 18 inches more straw.

Another bushel of the Hopetoun oat was sown on a poor marsh, recently reclaimed, 500 feet above the level of the sea. The other oats above mentioned were also sown beside it. Here there was not a single plant affected with the sedge-root. The Hopetoun oat appeared from nine to twelve inches above the others. The superiority of the Hopetoun oat, in point of grain, was estimated as at six to five in quantity, and about one pound per bushel heavier.

Mr Dennistoun's statement is as follows:

One quarter of the Hopetoun oat-seed was sown on the 2d of April, in a small field containing 2 acres 19 falls Scots, the soil of a cold quality, and not in good order. The crop was cut on the 15th September, and was, with respect to straw, larger and stronger than other fields in the neighbourhood. The gross produce was estimated by an experienced person at sixty-seven bushels per Imperial acre. Although the land was bad, the crop was considered equal to that of any similar extent on the farm.

Mr Storrie states that the Hopetoun oat was sown on a clay loam, near Falkirk, part of the same field being sown with potato-oat. The former grew well, but the latter failed in spring, and the Hopetoun oat was a little later in ripening,

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Six bushels were sown upon about a Scotch acre, the produce of which was nearly sixty-six bushels per Imperial acre. The oat was admired in the neighbourhood, and several applications were made for seed.

The early Angus Oat is well known for its early ripening, and the late Angus, commonly named Angus Oat, is also well known for its fine straw and grain, and although late in ripening, is the most esteemed species of oat in the early districts of Scotland, such as East Lothian and Morayshire. The grey Angus grown hy Mr Howden, is a subvariety of the white Angus, and has been known in this neighbourhood for twelve years past. It is more esteemed than the White or Angus Oat, grown by Mr Forsyth.

The experiments and statements evince the difficulty of ascertaining the merits of different varieties of grain by experiment, from the many contingencies affecting the results, the most powerful of which is the nature of the season. Some kinds of oats grow rapidly in the early part of the season, and soon attain their full height, such as the Polish and Georgian oats, both of which are stunted. Others grow slowly, and are later in arriving at their full height, such as the potato, Flemish and early Angus Oats, which are also short. Others continue to grow through the season, and are still later in attaining their full height, as the Hopetoun and Late Angus oats, which are taller than the others. When the early part of summer proves wet, and is followed by drought, the Polish and Georgian oats have an advantage over other kinds, as they attain their full height before the drought commences. When the early part of summer is very dry, and moisture succeeds, the Hopetoun and Angus oats benefit by the moisture, while the others mentioned do not. When the season proves wet throughout, and the different oats in consequence reach an extreme height, the smaller species frequently have an advantage over the larger in grain produce, in consequence of the straw of the latter becoming

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too luxuriant. When the weather during the past summer, so remarkable for moisture, and the habits of the Hopetoun oat, are taken into consideration, it will be seen that there could not be a more unfavourable season for bringing out the merits of this oat.

The results of an experiment are also frequently influenced by diseases or the depredations of animals. Mr Boswell and Mr Storrie both allude to their crops of potato oats having failed in spring, and perhaps the like effect was witnessed this year in every district in Scotland. A striking instance of this kind came under my notice. Four fields on this farm, pretty similar both as to soil and management, were sown with Hopetoun oats in the course of four successive days of good weather. The seed was the same in all the fields, and was deposited by a drill sowing-machine at the same depth. In three of the fields, the plants came quickly above ground, but in the fourth they remained long invisible. On inspecting this field, nine-tenths of the seed were found to have germinated in the first instance, and to have put forth a root and a stem, the latter of which had been eaten over by slugs when just peeping above ground, and killed in consequence of their repeated attacks. It is more than probable that the slug was the cause of the oat-seed brairding thinly in so many instances this season, and the potato-oat suffering more than other species, may have been owing to its being peculiarly palatable to these animals, or to the slowness with which the shoots of this variety come above ground, a peculiarity which, as I have observed, affords them an opportunity of destroying the plants.

The tulip or sedge root also influences the results of the experiment. With the view of discovering the cause of this disease, I this season sowed two rows of oats in a garden, and when the shoots were four or five days above ground the earth was removed from the roots of one row, and the neck or knot of the plants punctured or lacerated with a pin. The row of plants so treated was affected with tulip root, while

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the plants in the other row were not. From this experiment, I am inclined to think that tulip root results from an injury sustained by the plant near its neck. Every species of oat with which I am acquainted is liable to it.

Mr Boswell's experiment with the potato and Hopetoun oats shews an advantage, both in grain and straw, in favour of the latter; and from the grain of each being of the same weight, I have no doubt the Hopetoun oat would also yield more meal, as its husks are thinner than those of the potato oat. It must, however, be admitted that the experiment was not satisfactory, in consequence of the Hopetoun oat "braiding thicker, perhaps twice as thick as the other." At the same time, I do not doubt that the thinness of the potato oat was favourable to its grain produce.

The experiments of Mr Forsyth and Mr Howden with the Hopetoun and Angus oats are satisfactory, inasmuch as the two oats are like each other in their mode of growth, while the latter is the most esteemed species cultivated in the respective districts in which the experiments were made. On consulting the tables for the time of ripening, it will be seen that there were thirteen days in the one case, and twelve in the other, in favour of the Hopetoun oat. In respect to the quantity of grain also, the Hopetoun oat has the advantage; while the meal produced by the bushel of this oat is in the one case 1 lb. 10 oz., and in the other 1 lb. 2½ oz., more than that obtained from the Angus oat. It is in the case of mealing, the true criterion of the value of oat grain, that the merit of the Hopetoun oat is manifested. Supposing the Hopetoun and Angus oats equal in point of grain produce, and perhaps I am not warranted in rating the former so low, still the Hopetoun will be found to surpass the Angus oat by nearly 6½ stones of meal per imperial acre, and Mr Forsyth gives strong testimony to the fine quality of its meal.

In quantity of straw there are 64½ and 21 stones in favour of the Angus oat. This seeming superiority of the

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Angus oat may be owing to different causes, unconnected with the nature of the plant. In the first place, both Mr Forsyth and Mr Howden state the Hopetoun oat to have been thoroughly ripened, while the Angus oat was reaped in a comparatively green state. The superiority of weight of straw which the tables record in favour of the Angus oat, appear to me to be entirely owing to the moisture which it contained, and not to an innate property of the plant.

Mr Gorrie, in his statement, says the Hopetoun oat showed from 12 to 18 inches more straw than the Angus; and in every instance that came under my notice during this and preceding years, there was evinced a like superiority in length on the part of the Hopetoun oat. If this oat, therefore, does not yield a greater weight of straw than the Angus oat, there must be something fallacious in the appearance of the former; and although I am of opinion that it does yield more straw, still the point cannot be set at rest until the straw of each is thrashed and weighed in spring, when both are in a dry state, and after a season when both kinds of oat have ripened thoroughly.

Some individuals residing in this neighbourhood endeavoured to prove the Hopetoun oat a well known species with a new name, but their efforts have been abortive. One individual alone ventured to record such an opinion in writing, but lately retracted it, after inspecting and comparing, in my presence, the produce of his own farm.

It has already been stated how I became possessed of the Hopetoun oat; and whether it originated from the sexual intercourse of two known species—from the effects of cultivation—or from some freak of Nature—will, in all probability, remain inscrutable to man. There seems, however, no reason to doubt the oat being new in the cultivation of the country. The grains of the Hopetoun oat, when discovered in 1824, were long and meagre, and maintained the same appearance 1825. Since then, the grains have continued to improve, and

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this year part of the crop on Mungoswells farm seems equal, in quality of grain, to any potato oats grown thereon for fifteen years past, and perhaps the plant has not yet attained its maximum of improvement. This progressive improvement seems to indicate that the oat was new at the time of its discovery, and should teach raisers of new field-plants not to be discouraged with their first prospect of success.

The Hopetoun oat may be described thus: The leaves resemble those of the Angus oat; they are neither broad nor narrow, and seem to shrivel much as the crop reaches maturity. The oat, on escaping from the sheath, has a faint appearance of that of the Tartar oat, and at first seems to incline all the spikelets to one side. This appearance soon subsides, and the expanded ear is large in size, and crowded with small spikelets interpersed among the large ones. The straw, and more especially the chaff, assume a purple tinge, which forms the chief characteristic of the plant when growing. The straw is long *, reedy, and remarkable for resisting the effects of weather, a peculiarity manifested here this season, in the case of a crop growing on upwards of twenty acres, averaging nearly six feet in length when reaped, yet neither the quantity nor quality of grain suffered from exuberance, technically called Sloaming. The grains, in appearance, resemble the Flemish species; they are not so short and plump as the grains of the potato oat, nor so lank and long as those of the Angus, but they are thinner in the husk than either, and abound with small grains, which grow, as it were, in the bosom of large ones, called Bairns by farmers: hence the extraordinary mealing qualities of the oat compared with its weight. The oat is early, as both the preceding tables and statements testify.

Objections have been raised to cultivating a long-strawed

* Straw is powerfully affected by the number of plants upon the ground. When oats are sown much thinner than usual, the straw is thereby increased in length. The reverse takes place with the wheat plant.

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species of oat on fertile ground, from the injury which the crop sustains by being lodged. The Hopetoun oat obviates this objection, from its strong, reedy straw, and shrivelling foliage. It has this year been tried on the richest and best managed soils, situated in the finest climates of Scotland, and during the wettest season on record; still the returns, both of straw and meal, under such circumstances, prove it inferior to no species at present known; and, there is reason to believe, that, in a dry season, it would be superior to all others. It is therefore not only adapted to what may be called infield culture, by furnishing plenty of meal; but its abundant straw will, in the shape of manure, augment the other products of the farm, and, by excluding air from and shading the soil, have a tendency to destroy weeds, and to render a repetition of summer fallow less frequent.

As evidence of the favourable impression made by this oat in East Lothian, it may be mentioned, that last season about ten quarters were sown, besides those on this farm, and only one individual risked more than eight bushels;—for next, I have already seed-orders for eighty-five quarters, from individuals within the county, sixteen bushels having been ordered for one farm.

Throughout a great part of Scotland cultivation is indispensable to cattle-rearing, and pursued chiefly with a view of providing straw for winter fodder, and manure for raising turnip. In such situations, the Hopetoun oat would furnish those desirable requisites, and, at the same time, afford improved grain. Therefore, to all the late and upland situations of Scotland, the Hopetoun oat is likely to form a boon of no small value, and may even be the means of extending cultivation there.

When superintending the reaping of a strong and lodged crop of Hopetoun oats this season, my attention was directed to a plant which was with difficulty preserved from being cut down. It consisted of ten or twelve stalks, three of which

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were retained, and the remainder put into a sheaf. The three stalks were 7 feet 5¾ inches in length, nearly 2 inches in circumference, and yielded 1419 grains, each ear averaging 373 grains. These stalks and grains are still in my possession; and from the latter I intend raising a stock of seed, by which means I hope to improve the quality of grain, and preserve that genuineness of character for which the seed of the Hopetoun oat is at present distinguished.

MUNGOSWELLS,
14th December 1830.

ON THE CULTIVATION OF *ASTRAGALUS BOETICUS*, AS AFFORDING A SUBSTITUTE FOR COFFEE. *By ADAM FERGUSSON, Esq. of Woodhill.*

THE Society having offered a premium towards encouraging the introduction of any useful plant or root into the field culture of Scotland, a statement is hereby submitted in reference to that object.

The *Astragalus Boeticus* has been long cultivated in the North of Europe, and used to a large extent in Germany and other countries adjacent, bearing the ordinary name of *Swedish Coffee*. It will not be asserted that the produce of this plant can compete with the genuine coffee berry, in aromatic and stimulating qualities; but that it may be adopted by our population as an excellent and wholesome beverage, greatly surpassing any substitute for coffee yet known in Great Britain, is a point which may with confidence be affirmed. It was yet to be ascertained whether our soil and climate were adapted to its growth; and with this view, a portion of ground in a thin gravelly soil, in the Highlands of Perthshire, was sown with half a pound of seed in drills.

Circumstances unfortunately retarded the period of sowing

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until the 3d of June, at least two months later than it ought to have been. In addition to this, the rainy and backward season rendered the ripening of the pods almost a total failure. The plants vegetated with great luxuriance; some of the straw (resembling fine tares) measured 8 feet in length, and generally bore four pods upon each stalk, and about six seeds in each pod. From an anxiety to obtain some of these in a ripe state, the crop was allowed to stand until the middle of December, when a severe night of frost suddenly blasted every hope. It is certainly, however, sufficiently hardy to ripen in any part of Scotland; and it may be remarked, that in a sharp frost which destroyed the potato stems about the middle of October, the Astragalus displayed an important elasticity of constitution; for although it had been severely touched by the frost during the night, it recovered, instead of sinking as the potato does, under the genial rays of the sun.

This unsatisfactory report is submitted with diffidence, and principally for the purpose of offering to repeat the experiments in a more correct manner next season, should it appear to be an object of any interest to the Directors.

DESIGNS OF FARM BUILDINGS, DRAWN UP UNDER THE DIRECTION OF A COMMITTEE OF THE HIGHLAND SOCIETY OF SCOTLAND

[THE Highland Society, convinced of the many errors committed in the laying out of the Out Houses of farms, offered premiums for the best Designs of this class of Buildings. The candidates were required to communicate, in the form of a short Essay or Report, their opinions with regard to the choice of situation of such buildings, the form, dimensions, and best arrangement of their several parts, as regarded the Barns, Stables, Cow-houses, Feeding and Shelter Sheds, Granaries, Yards, &c.; the defects commonly

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observable in the construction of this class of buildings; and generally, to offer any suggestions upon the subject which their observation and experience might enable them to make. They were further required to keep in view, that the object of the Society was to obtain useful plans, really fitted for the purposes of ordinary farms, and that no designs would be considered as fulfilling the object proposed by the premium, unless they should be formed with a regard to economy, as well as to the extent and nature of the accommodation to be afforded.

Various Designs were produced in competition for the premiums offered, many of them possessing great merit, and accompanied by essays from the architects giving the necessary description of their Designs, and detailing their opinions on the general subject of Farm-Building. Premiums were awarded for a considerable number of these Designs and Essays, and the Society contemplates the publication of them, either in the Transactions or in some separate form.

Whether, however, from some defect in the conditions of the premium offered, or whether from the architects disregarding expense, in their anxiety to produce designs the most complete in their nature and arrangement, it appeared to the Directors that the Designs did not entirely fulfil the purpose contemplated by the Society, namely, that of procuring plans fitted for the purposes of ordinary farms, and at the least possible expense. Besides, the Designs were, by the conditions attached to the offer of the premium, limited to two classes of farms only, namely, one employing two ploughs, and one employing six ploughs, a circumstance which, of itself, prevented the ingenious architects who came forward from exhibiting those variations of arrangement which such buildings require, according to the size, nature, and mode of occupation of the farms. For these reasons, a Committee of the Directors was appointed

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to prepare another series of Designs, adapted to different classes of farms, and calculated to afford the necessary accommodation which such farms require. This Committee employed Mr Waddell in Berwickshire, an architect of great experience in the laying out of farm-buildings, to draw up a set of Designs conformably to the views of the Society. Mr Waddell prepared a variety of Designs, of which twelve have now been selected for publication.

The Designs themselves are not formed with the least attention to architectural embellishment. They are of the plainest form, and are laid out solely with a view to utility. They are designed to show what accommodation is required for different classes of farms, and to correct the errors too frequently committed in the management of the different parts of the buildings. One of the most common of these errors is the crowding the buildings together, under the idea of giving them greater compactness, and the not sufficiently extending the shelter-sheds for the feeding of cattle. This is a fault so universal, that it is only on the larger class of breeding and feeding farms in the border counties of England and Scotland, that experience has taught builders fully to avoid it. In some of the Designs prepared for the Committee, a much larger extension was given to the shelter-sheds, than appears in the designs now to be given; but as these last seemed to combine some other advantages with regard to arrangement, they have been selected for publication in preference to those in which more attention was paid to the arrangement and extent of the feeding and shelter sheds.

In giving Designs of the out-houses of a farm, little more can be done than to present useful examples. Although a certain similarity must exist in the form and arrangement of the parts of all such buildings, yet these must be modified according to the circumstances of the farm itself; the nature of the soil; the situation with regard to markets, and

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the particular kind of management to be pursued. No one rule that can be given is of general application, and the judgment of the architect must be shown in adapting the size, form, and arrangement of the buildings, to the nature of the farm and wants of the occupier. While every suitable accommodation should be afforded to the tenant, it is the province of the architect to take care that the heavy cost of such buildings be not unnecessarily enhanced, either by erecting buildings that are useless, or by giving unnecessary dimensions to such as are requisite. It may be particularly remarked, that the giving unnecessary breadth to the buildings, adds materially to the expense, by increasing the dimensions of the timbers, and adding to the size of the roofs. At the same time, care must be taken, that, in the cow-houses and stables, the animals shall not be cramped from the want of necessary room.

In general, it may be said that the most convenient arrangement of the out-houses of a farm, is in the form of a rectangle, the side to the south being open, and the farm-house being placed at some convenient distance in front of it. The most approved mode of keeping and feeding the larger and finer kinds of cattle, is in small sheds, with open yards attached, each capable of holding two animals. In the Designs which follow, the sheds are of larger dimensions, but they can be subdivided where this mode of managing the feeding-stock is adopted.

The plans of buildings which have been obtained, have been divided into classes, according to the size and mode of occupation of the farms, as under:—

1. For Farm of 1000 acres, kept in a rotation of Crops and Pasture, and employed partly in Breeding and partly in Feeding Stock.
2. For a Farm of 500 acres, kept in a rotation of Crops and Pasture, producing Turnips, and employed partly in Breeding, and partly in Feeding Stock. *Two Plans.*

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3. For a Farm of 150 acres, kept in a rotation of Crops and Pasture, producing Turnips and Potatoes, and employed partly in Breeding, and partly in Feeding Stock. *Two Plans.*
4. For a clay land arable Farm of 500 acres, not producing Turnips, and kept chiefly or wholly in Tillage.
5. For a Dairy-Farm of 500 acres, kept in a rotation of Crops and Grass, one half being supposed to be in Hay or Pasture.
6. For a Farm of 200 acres, situated near a town, employed wholly in Tillage, where no stock is kept but horses and family cows, and where the whole produce is sold. *Two Plans.*
7. For a Sheep or Mixed-stock Farm, in a high country, employing a pair of horses.
8. For a Cottage-Farm of 25 acres. *Two Plans.*

Accompanying these Designs was the report of Mr Waddel, explaining his general views upon the subject, and detailing the mode of executing the work. The following is the report as approved of by the Committee.]

In designing the following plans, wherever uniformity and convenience could not be combined, the preference has been given to the latter; and nothing has been proposed but what has been found, from experience, to be useful and practicable. But it is quite impossible, especially in the largest class of farm-buildings, to get all the apartments arranged so conveniently as could be wished, consistently with any degree of regularity; nor does it seem to be possible to lay down a plan that will suit the wish of all farmers, there being so great a diversity in the modes of occupation, kind of management, situation, soil, &c.

It is recommended that the water-course from the stables, cow-houses, and yards, should be carried off by causewayed open channels to a pond or tank near to the buildings. This

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mode of conveying away and receiving the urine is conceived to be better, in ordinary cases, than sewers below ground, which, even when executed in the best way, will be subject to be choked up from the want of necessary attention to cleaning. Further, such sewers become nurseries for rats, notwithstanding every precaution that can be taken. Should the situation of the buildings incline to the north, conduits can be made through the north range below the floors, at proper places, for discharging the liquid.

With respect to watering the cattle in the yards, no drawing of the mode of doing so is given, as this must be regulated by the circumstance, whether the water is to be got from a stream or from a well. If a stream cannot be obtained, there are few situations where water cannot be got by sinking a well; and the best way is to raise the water into a cistern, which may be placed in any of the shelter-sheds, or other houses, 7 feet above the ground; or, if the water will not rise so high, a small apartment may be made for it, and from this the water conveyed to the different yards and places where it is wanted, with proper cisterns, and a ball-cock to each.

The shelter-sheds and yards should always be open to the south; and the sheds, unless where they are very large, will be found to answer better with only one opening in front, as, by this means, they afford more warmth to the cattle. The usual objection to this is, that one ill-natured beast will keep out the rest. This, however, seldom happens. A farmer of much experience recently told the writer, that, last year, he built up all the openings, except one, in one of his sheds, and that he knew a great difference in favour of the stock in that yard, as compared with those in which there were three or more openings in the sheds. The animals were finer in the skin, and, in other respects, in better condition.

In some of the plans transmitted to the Society, large granaries are laid out, which are necessary in some situations of the country, but which, in others, are not necessary.

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It may appear in several of the plans sent, that the passages and the entrances to the different apartments are wider than necessary; but it is a matter of great consequence to have open and free access, where a number of carts and cattle frequently come in contact.

As it is necessary to lay up a stock of turnips as a supply when they cannot be got from the field, either on account of frost or wet weather, a turnip-house is delineated in some of the plans, though it is to be observed that these turnip-houses are of no great utility, since it is found that turnips keep much longer when put together in a sheltered place, well covered with straw, than they will do in a close house.

No drawing has been made either of a water-mill or steam-engine-house for the thrashing-machine, as the erection of these is subject to circumstances, and their size and position naturally under the direction of the millwright.

In all the plans here designed, the gates are shown to be hung on wooden posts, which are not so easily knocked down by carts as common stone pillars. But this does not prevent the adoption of hewn-stone pillars, which both have a better appearance, and are much stronger.

All the inside gables are intended to be carried to the top.

For the largest class of farms (No. I.), five sets of plans are transmitted *. It may appear that there are too few feeding-yards for so large a farm, but the calculation which has been made is, that one-half of the turnips are eaten by sheep on the ground. In some of the plans, a house for an overseer, or principal servant, is designed, and also a carpenter's shop and a smithy, which, strictly speaking, form no part of the out-houses of a farm, but which are yet of great convenience when a farm is distant from a town or village.

With regard to ventilating the stables and cow-houses, seve-

* Only one of these is here given.

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ral ingenious methods are proposed in the Essays transmitted to the Society. Where these, however, are supposed to be impracticable, or too expensive, it is recommended that openings of about 6 inches high, and the same width as between cupples, shall be made in the roofs, about 2 feet above the wall-head, to be brought to a perpendicular front in the inside, and fitted up on front with boards about 3 inches broad, hung by pinions, and to be moved by a crank in the same way as the weather-boards in a granary window. One, two, or three of these in a stable or cow-house, according to the length of the apartment, will, if attended to, be found to be of great service.

In all the boiling-houses, the roofs should be lathed and plastered in the inside, round by the back of the cupple, and should have a large ventilator to let off the steam. The saddle-horse stables should be plastered in the same way.

In making a calculation of the expense of these buildings, the corners, ribbets, arches, and skews, are supposed to be of hewn stone; the wood Memel; the slates Easdale; the ridges and flanks covered with lead; and the cost and workmanship of all the materials are included, except the prime cost of stones. In most of the plans, metal pillars are designed for the cart-sheds; but where stones can be easily procured, it is recommended that they should be made use of in preference to metal. The stones should be 1 foot 8 inches broad, and 1 foot 2 inches thick, as represented on plan, No. V.

General Outlines of a Specification to the Plans of Farm-Offices.

Digging.—The trenches for foundations to be excavated 2 feet below the surface of the floors, or more if necessary, to obtain a good solid foundation.

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Mason-Work.—The foundations to be laid with flat-bedded stones laid in regular courses, breaking joints alternately, and to be taken in by regular scarcements, as shown in the sections. The whole area of the dressing-barn and low granary floors to be laid over with small broken stones, forming the thickness of 9 inches. The sleepers to be laid on the inside scarcements, and the whole remaining space of 14 inches to be filled up with solid mason-work of stone and lime properly packed;—to have a coat of plaster $\frac{5}{8}$ths of an inch thick on the top, the surface of the plaster being kept $\frac{1}{4}$th of an inch below the top of the sleepers; care to be taken that the sleepers are resting on flat stones, at short distances; the lime which is applied next the walls all round, to be mixed up with a portion of broken glass. This, if carefully done, will keep the barn-floor clear of vermin, and also prevent it from sinking, as frequently happens. This under-building to be properly dry before the boards are laid on the top. The straw-barn to be done in the same way, with this difference, that the ruble building above the small stones is to be only 12 inches deep, and to have a composition floor laid above of 3 inches thick, 9 feet broad, and, where the straw falls from the rakes, to be laid with large flags. The foundations of the low buildings to be 2 feet 9 inches at the bottom, and taken in by regular scarcements.

Door-Soles.—The door-soles of the barns to be laid 6 inches above the surface of the causeway, on the outside; those of the stables, cow-houses, &c., to be laid 3 inches above it, and bevelled on the front.

Walls.—The thickness of barn-walls above the door-sole to be 2 feet 3 inches; above the second floor to be 2 feet, and beam-filled at the top. The thickness of the walls for the low buildings above the door-sole to be 2 feet, and likewise beam-filled at the top. The division-walls to be 1 foot 6 inches thick, and carried to the top. The foundation of the

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walls of the courts or yards to be at least 1 foot below the general surface, founded 2 feet 3 inches at the bottom.

Hewn Work.—All the external corners in the houses and gate-pillars to be droved, with broached tails. The ribbets, soles and lintels of doors and windows to be droved with broached tails; all the ribbets and corners to be at least 2 feet long, the inband ribbets to pass through the thickness of the wall. The ribbet-heads for barn windows to be 9 inches: the skews to be droved. The shed-pillars, arches, and chimney-tops, to be of broached ashlar. The shed and gate-pillars to be champhered or rounded on the corners 3 inches. The yard-walls to be coped with flat hammer-dressed or Galloway cope, as stones can be procured. The cooling-troughs, and the feeding-boxes for the cows on the dairy-farm, to be constructed with pavement.

Conduits.—If the water be carried away by under-drains or conduits, the great common sewer, or discharging conduit, to begin in a central part of the offices, to be 2 feet 3 inches wide, and 3 feet 6 inches high, so as to allow a person to go up to clean it. It may be arched or covered, as shall be most convenient; and the size of the side conduits to be according to the distance from the common sewer, namely, from 1 foot to 1 foot 6 inches wide, and from 1 foot 6 inches to 2 feet high, with chissel-jointed angle bottom, according to the sketch in the plate.

Causewaying.—The whole of the stables, cow-houses, calf-houses, pig-houses, &c., to be laid with whinstone causeway set in sharp sand. The settles for carrying off the urine to have 1½ inch fall to 10 feet, or 2 inches to 10 feet, if the situation admits, or all the fall which can be had. The run channels for stables to be 10 feet from the wall, and the rise from the channel to the rack to be 5 inches. The channels for cow-houses to be 9 feet from the wall; the rise from the channel to the sole-tree to be 4 inches. The area round the yard to be causewayed, and to have proper channels, with

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2 inches declivity to the 10 feet, made so as to carry to the settling-pits. In situations where the extent of causewaying in the areas round the offices is considerable, by making the causewayed channels 4 feet broad, that is, 2 feet on each side of the run, the space between that and the buildings will answer nearly as well to be made up with small broken stones 9 inches deep, and blinded on the top with small clean water sand. This, in a short time, will become a smooth hard substance, and will be obtained at less expense; or, if conduits are adopted, gratings must be made at proper places to communicate with the conduit; the gratings should be strong, and have the ribs well bent upwards, as in that form they are not so liable to be choked up.

CARPENTER WORK.

Roofing.—The cupple sides for houses of 15 or 16 feet wide, to be 6½ inches at bottom, 5½ inches at top, and 2½ inches thick, with a balk 6 by 2½ inches, fixed as near the middle of each cupple as possible with double garron-nails, and properly rivetted. The cupple-sides for houses 18 feet wide, to be 7 inches at bottom, 6 inches at top, with a balk or scantling to each, 6½ by 2½ inches, fixed as above. The cupples to be set at 20 inches from centres, on a wall-plate 7 by 1½ inches, the sarking to be ¾ths of an inch thick, well seasoned and jointed closely. The sarking on the granaries to be half checked on the joints. Ridge-bottoms to be 2 by 1¼ inches, fixed to the roof with iron spikes, 3 feet apart.

Joisting and Flooring. — The sleepers in the dressing barn and the low granary floors to be 6 by 2½ inches, built in as described in the mason-work. The joisting in the loft for unthrashed corn and granaries to be 10 inches deep by 2½ thick, with 1 foot of wall-hold. Joisting and sleepers laid at 20 inches from centres, all covered with Dram timber.

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batens; under floors to be plain jointed, and doubled with iron douls; the upper floors to be tongued and feathered on the joints, and fixed down with good flooring-sprigs. The cart-sheds to have a joist built into the wall at each pillar, 8 inches by 2½, and the wall-plate nailed down on the top of it. Those that have metal pillars should have lintling-beams, 9 inches by 12 broad, and the end of the joist tenanted 2 inches into the lintel, to have an iron strap, split on the end, and put on the top with screw-bolts, to fix the joist and the lintel together. The joist going through the back-wall and the under side, to be checked into a piece of wood, 3 feet long, 2½ inches thick, and about 6 inches broad, built into the middle of the wall; also the wall-plate nailed on the top:—this will keep the pillars firm in their position.

Safe-Lintels.—The whole of the safe-lintels to have a wall-hold of 9 inches, to be 1 inch thick for each foot of the openings they cover, and from 9 to 12 inches broad; the whole breadth filled in like manner behind, and arched above where there is room.

Doors.—The whole of the doors to be made of deal not more than 6½ inches broad, 1¼ inch thick, beaded on the edges, and grooved and tongued on the joints with three cross bars to each, 9 inches broad, 1¼ inch thick, and well nailed. The stable, cow-house, and barn-doors to be 3 feet 6 inches wide, and hung in two leaves where necessary, which is the case in some of the stables. The straw-barn and granary doors to be 4 feet wide, the whole of the doors to be hung on crooks with bands, the crooks to be laid on the bed of the ribbet. The crook to be split in the tail, to have 7 inches hold of the stone; the pin of the crook to be 1⅛ inch diameter, each crook 3½ lb. weight, well batted in with lead; and for 4 feet wide doors the crooks to be 4 lb. each, and the pin to be 1¼ inch in diameter.

The bands for 3 feet 6 inches doors to be ⅝th of an inch thick at the neck, and 2 inches broad, 22 inches long, having

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a proper taper, both in breadth and thickness from the neck to the tail, and to have a $\frac{5}{8}$th screw-bolt to the neck of each, the weight of each to be $4\frac{1}{2}$ lb. Those for 4 feet doors to be 23 inches long, $\frac{1}{2}$ inch thick by $2\frac{1}{2}$ broad at the neck, with a bolt as above, and to be $5\frac{1}{2}$ lb. weight each. The band-nails to be counter sunk, and properly rivetted. The latches for doors to be of the kind with a sunk ring, but stronger made than in general. Locks to be selected according to the use of the different places where they are applied.

Windows. — The frames of the lower windows of barns, stables, cow-house, &c. to be made 2 inches thick, with boards below 16 or 18 inches high, hung on the frames with cross-tailed bands, and glazed above with second crown-glass; those in the granaries, and other places where glass is unnecessary, to be filled with weather-boards, 6 inches broad, 1 inch thick, champhered on the outer edges, hung with iron-pivots, in a frame 3 inches by 2, having a strap of iron attached to the inside, and moved up or down to admit air into the places when required. All the lower windows of the barn to be secured by iron bars 1 inch square, and not more than 5 inches apart, batted into the sole and lintel, and to have a cross bar in the middle, and the upright bars passing through it.

The dressing-barn and granaries to have skirting-boards, 8 inches broad by 1 thick, nailed on bond timber built in the walls.

Trevises, Racks, and Mangers.—The hind-posts of the trevises to be 8 feet 6 inches long, $6\frac{1}{2}$ inches square, made in the octagon form, above the level of the pavement,—to be sunk $3\frac{1}{2}$ feet below the level of the pavement, and to be solidly built round, 3 feet in diameter, with stone and lime mortar; the parts of the posts to be properly charred on the ends, as far as they go below the ground, their tops to stand 6 inches above the trevise-boards, and to be rounded. The height of the fore-posts to be 9 inches above the top of the

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racks, 4½ by 2 inches, and their foot set in stones, one on each side of the boards, and a piece of wood the thickness of the trevise-boards fitted in between the post above the trevise-boards. The trevises to be 8 feet long from the wall to the outside of the hind-posts. The trevise-boards to be 1½ inch thick, mortised 1½ inch into the hind-post, and properly nailed into the fore-posts with 20d. nails; and the boards to be put together on the joints with iron douls, at 2s. to the hundred. The trevises to be 4 feet 6 inches high at the hind posts, and 6 feet high at the front posts, and to have angle spars or warpings on each side 4 inches by 1¼, and properly nailed.

Racks.—The racks to be 2 feet 10 inches broad, the sides to be 4 by 2½ inches, and the spars to be 2¼ by 1¼ inches, sunk ⅝-inch into the sides, at the distance of 3¼ inches apart, and well nailed.

Mangers.—The mangers to be 20 inches at the top by 16 at the bottom, and 10 inches deep; wood to be 1½ inch thick at the bottom, and the sides to be 1¼ inch thick. The under racks to be 2 feet 3 inches high; the rails at the top and bottom to be 3 by 2½ inches, and to have a run-beam rounded on the top, 4 by 3 inches, fixed along the top of the racks, with rings for securing the horses. Each box or manger to have a back lining or skirting on the top, where it joins the wall, sloping backwards, to prevent any of the corn from being lost. A piece of bond wood, 5 by 3 inches, to be built into the wall for fixing the harness-pins.

Plaster-work. — The stables for saddle-horses and the boiling-houses to get all one coat of plaster on the walls, and the ceilings to be all lathed and plastered round the back of the cupples and balks with two coats of plaster. A ventilator to be made in the ceiling of the boiling-house. The front walls of the work-horse stable also to get a coat of plaster, to prevent the harness from being injured, by rubbing against the rough wall. The dressing-barn and granaries all to get one coat of plaster, and especial care to be taken to have

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the plaster applied close down to the floors, and close up to the under side of boards over the joists, to prevent vermin being admitted.

Slate-work.—The whole of the roofs to be covered with Easdale or Ballachoulish slates. The slates to have 2 inches of cover over the nail at bottom, and diminishing gradually to 1½ inch at the top, all being put on with nails of 12 lb. to the thousand, and boiled in linseed oil. The whole of the ridges and flanks to be covered with milled lead 12 inches broad, 6 lb. to the superficial foot. The piends to be covered with lead 10 inches broad, 6 lb. to the superficial foot.

Court or Yard Gates.—The gate-posts to be sunk 3 feet into the ground, and burned or charred as far as they go into the ground; the posts to be 9 inches square, champhered on the corners, and set 3 inches clear of the pillars, and to stand 9 inches above the gate, rounded on the top, and built in the ground with stone and lime 4 feet in diameter. The hanging post of the gate to be 5 by 4 inches; front post to be 4 by 3 inches; centre piece to be 3¼ by 2¼ inches; angle spar to to be 1⅝ inch thick, 4½ inches broad at the foot, tapering to 3½ inches at the top. The uppermost spar to be of 1¼ inch iron at the end next the hanging post, diminishing to the front post to ¾ inch, to go through the posts with a shoulder and an eye at the hanging post, and a screw-nut on the end at the front post. The crooks to be put into the gate-posts with nuts on the ends. The spars of the gate to be 4 inches broad at the hind end, diminishing to 3½ inches at the front, by 1¼ inch thick; the intersections put together with ⅝ inch screw bolts.

Painting.—The whole of the outside doors, windows, and gates, to get three coats of oil paint, the windows to get a coat before being glazed.

Wood.—The whole of the wood used to be of Memel timber, well chosen. The barn and granary floors may be laid with Dram batens.

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DESIGN No. I—*For a Farm of* 1000 *acres, kept in a rotation of Crops and Pasture, and employed partly in Breeding and partly in Feeding Stock.*

For this class of farms, five designs were given, but the last only is here represented. The four first shall however be adverted to in general terms.

The *first* was designed with the straw barns near the middle of the north range; the feeding yard and yards for wintering cattle on the south, with a turnip-house in the middle. The pillars for the cart-shed were represented as of cast-metal, set in large stones; the advantage of which is that they take up less room, but in situations where freestone can be procured at a moderate expense, it will be found to answer better, and make a more stable support for the roof, and, every thing considered, will come to less expense.

The width of the stable was represented as 15 feet within walls, but where a trifling expense is no object, it will be better to make the width 16 feet. The corn was intended to be hoisted by the machine from the dressing barn through a hatch and conveyed to the upper granary. The granary was meant to stretch over the apartments for the bull and calves, making the length of granary below and above to be 104 feet by 18½ feet wide. As this, however, in some situations, is more than is necessary, the extent could have been contracted by making the upper granary no longer than the under one.

To execute this plan in a good and substantial manner, including the prime cost and workmanship of all materials, but exclusive of the expense of leading forward the materials, and of the prime cost of stones, also of servants' house, carpenter's shop, and smithy, was computed to cost about L.1700; or, if the roof were covered with tiles, L. 1800.

In the *second* design, the barns were placed behind the sheds, which allowed the courts to be supplied with straw, in as

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convenient a manner as could be expected in so large an onstead. The granary was over the shelter-sheds. The stables were situated on the east side of the yard, with the cart-sheds adjoining. The yards in this design were considerably longer than in the first. There was no turnip-house, but there was a square laid off opposite the feeding courts for storing turnips.

To execute this plan, exclusive of overseer's house, carpenter's shop, and smithy, was computed to cost L. 1600; if covered with tiles, L. 1230.

The *third* plan was very similar in its arrangements to the last, but with the straw and feeding yards much larger.

To execute this plan, exclusive as above mentioned, was computed to cost L. 1550; if covered with tiles, L. 1200.

The *fourth* design was conceived to present a better arrangement than the three foregoing ones. In it the lower and upper granaries were proposed to be 92 feet by 18 feet, which, however, could be reduced or extended according to circumstances.

This plan, exclusive of carpenter's shop, smithy, &c. and exclusive of the carriage of materials, was computed to cost L. 1650; if covered with tiles, L. 1308.

This *fifth* design is that represented in the figure, and is similar in some of its arrangements to the first, though its lateral size is reduced, by placing the saddle-horse stable, &c. in the square in front of the stable. The length of the south division may also be reduced, by placing the mare and foal house, with the pig houses, on the line CD, in front of the barns, by making the boiling-house and poultry a few feet less, and by placing the potato-house where the mare and foal house is at present. The straw and feeding courts will be easily supplied with straw from behind, as the straw-house is situated nearly in the middle. The lower and upper granary in this plan extend to 91 feet by 18 feet; but if this should seem too large, it is easy to make it less, by not extending it

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over the calf-house. The cart-sheds are here thrown into a square, though it might be better to extend them in a range on the line LV. The size of the yard here is moderate, but may be easily enlarged to answer the purposes wanted.

This plan, exclusive of the carriage of materials, and of the prime cost of stones, could be executed for about L. 1580; and, if covered with tiles, for about L. 1200.

No. II.—*For a Farm of* 500 *acres, kept in a rotation of Crops and Pasture, producing Turnips, and employed partly in Breeding, and partly in Feeding Stock.* Two Plans.

* 1.—In this plan the shelter-sheds are placed within the square, and, should they be thought too small for a farm producing a great quantity of straw, they may be enlarged by throwing them a few feet forward. There are also designed an overseer's house, and a smithy and carpenter's shop. Should these not be required, the cart-sheds could be placed where the overseer's house is; the boiling and potato houses at the west end of the riding-horse stable, and the west wing done away with altogether. A poultry-house could be taken off the straw-barn. By this means a considerable expense would be saved. The lower and upper granary would make an extent of 70 feet by 18 feet, which would be a suitable size for such a farm.

To execute this plan, exclusive of the overseer's house, smithy, and carpenter's shop, and exclusive of the carriage of materials and the prime cost of stones, will cost about L. 1300; if covered with tiles, it will cost about L. 1020.

* 2.—It will be observed that this plan is differently designed from the former, and upon a more reduced scale, though the yards are considerably larger. The small yard in the middle will be found to be very useful for different purposes; but, if not required, it may be thrown into the

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straw-yard on the east side. And, on some farms, the length of the straw-barn would be quite sufficient, were it to terminate at A, that is about 8 feet shorter. If the situation admitted, the cart-sheds would be better to be open to the west, as the cows going out and in are apt to be rambling among the carts, and thereby injuring themselves. This plan, it is conceived, will be found extremely convenient.

Exclusive of carriages and prime cost of stone, it will cost about L. 1190; if covered with tiles, about L. 940.

No. III.—*For a Farm of* 150 *acres, kept in a rotation of Crops and Pasture, producing Turnips and Potatoes, and employed partly in Breeding, and partly in Feeding Stock.* Two Plans.

* 1.—This plan will afford all the accommodation that could be wished for in a farm of this size. The form of a horse-course is here added, for, unless water can be easily procured, a farm of this extent will not afford the expense of steam or a wind power. The stables containing but four horses will answer very well at 15 feet wide.

This plan, exclusive of the expense of carriage and prime cost of stones, will cost about L. 600; if covered with tiles, about L. 476.

* 2.—This plan is on a more reduced scale than the last, but it may afford sufficient accommodation where the land is not of a very productive quality. The size of some of the buildings may not suit the mode of occupation in some places of the country, but these can easily be reduced or added as required.

This plan could be executed, exclusive of the carriage of materials and the prime cost of stones, for about L. 550; and if covered with tiles, for about L. 465.

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No. IV.—*For a Clay land arable Farm of* 500 *acres, not producing Turnips, and kept chiefly or wholly in Tillage.*

In this plan the stables and cart-sheds are conveniently situated, and the barns are well placed for supplying the courts or yards with straw. The dung from the stables and cow-houses is designed to go into the yards by the small gates. The yards here may be differently divided, if it be thought expedient. The extent of granaries above and below, together, is 88 feet by 18, perhaps more than in some, and not more than in other cases, might be required. The boiling-house in this plan is not so near the stables as could be wished; but, as there is not room for it and for the potato-house in the same range where the stables are, and it being necessary to keep it near the outside of the square, and as far from the barn-yard as possible, there is no other part where it could be so properly placed, except it were placed where the cart-sheds are, and the cart-sheds were made in the west range, which would be found to be attended with inconvenience. The flue of the boiling-house here may go round the back of the poultry-house, and the chimney be erected on the west end of it. There is also a plan for a small stove in the harness-room, next the saddle-horse stable, which will be found to be of great use in winter or damp weather.

This plan, exclusive of the carriage of materials and the prime cost of stones, will cost about L. 1260; and if covered with tiles, it will cost about L. 1020.

No. V.—*For a Dairy-Farm of* 500 *acres, kept in a rotation of Crops and Grass, one-half being supposed to be in Hay or Pasture.*

This plan is designed for a dairy farm, and it is considered that a great proportion of the cows are fed on boiled or steamed food. There are two boilers, one being intended

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for steam, and the other for boiling in the common way. The stalls, except those in the cow-houses marked A B C, are designed for the cows fed on boiled or steamed food, and may be fitted up with flat stones. On the supposition that a part of the cows are not giving milk, some of the cow-houses are designed with stalls in the common way, that the cows may be fed with straw, hay, or turnips. The cow-houses A, B, and C, are intended for cows fed on straw, hay, and turnips. In farm-offices of this kind, a turnip-shed may be necessary, in order that a supply of turnips may be obtained, free of frost in winter. Those cow-houses intended for the cows feeding on boiled or steamed food, are all arranged as near as possible to the boiling and store houses, with large open passages for conveying the food to all the different places. The dung pits are also constructed as near the cow-houses as possible. The walls round these pits need not be higher than 3 feet.

A shelter-shed is designed on the west side for a few young cattle. If this should be required, the wall around it should be 6 feet high. On a farm of this kind, a considerable number of pigs may be kept. A number of sheds for them are therefore laid out in a convenient situation, and more can be added if necessary. A good supply of water to a steading of this description is of great importance; and the cistern may be put up over the gig or store house. A superintendent's house is also designed, it being necessary that such a person should be near the establishment at all times. It will also be proper to attend particularly to the cleaning and ventilating of the cow-houses. In some farm buildings of this description, the dairy is connected with the out-houses; and the same power that drives the thrashing-machine gives motion to the churn. But it is conceived that it would be more convenient to attach the dairy to the farm-house at a little distance from the out-houses, where there would be purer air, and where the work is to be performed under the eye of the

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landlady. But as the dairy does not, in the present design, form a part of the out-houses, no plan of it is given.

This plan, exclusive of the carriage of materials, and the prime cost of stones, will cost about L. 1300; if covered with tiles, about L. 1000.

No. VI.—*For a Farm of* 200 *acres, situated near a town, employed wholly in Tillage, where no stock is kept but horses and family cows, and where the whole produce is sold.* Two Plans.

* 1.—This plan of offices is supposed to be situated on the side of a public road near a town. The doors on that account are placed in the inside of the court, with a wall in front 8 feet high, that they may be locked at night; but, in other situations, this wall would be unnecessary. In this plan there is ample room for every purpose, subject to alterations to suit the different views of the occupier.

To execute this plan, exclusive of the carriage of materials, and prime cost of stones, will cost about L. 600; if covered with tiles it will cost about L. 470.

* 2.—This is a plan with a view to the same kind of situation, arranged in a different way, and upon a smaller scale. It will be found in most situations to afford tolerably good accommodation. The dressing-barn might answer a few feet shorter than it is represented. If the straw-barn is thought short, the space thus gained could be thrown into it. It is proposed to make the straw-barn 10 feet high to the joists, which would hold a sufficient quantity of straw, and give room for putting it up in bundles for the market, &c. The granary above this will be 4 feet 6 inches high from the floor to the top of the wall, which, with 6 inches of beamfilling, will give 5 feet from the floor to the intersections of the cupple. If these offices were not on a public road-side, it would be as well to make the boiling-house and poultry-house to face the south.

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This plan, exclusive of the carriage of materials, and prime cost of stones, will cost about L. 550: if covered with tiles, L. 400.

No VII.—*For a Mixed-stock Farm, in a high country employing a pair of horses.*

No. VII.—This plan being intended for a hill farm, it is supposed that only one pair of work-horses is employed, but the stable is made to hold four, because on a farm of this sort, there should always be a third ready to be employed occasionally,—frequently a breeding mare; and the fourth stall is required for a riding pony. It is supposed that three or four cows are to be kept, with their calves brought up to two or three years old, which will consume all the fodder produced by this extent of labour. Should more horses be employed, or the farm produce much meadow hay, more cattle might be kept, and consequently the houses for cattle would require to be enlarged. A room is designed for holding wool, which by some may be thought unnecessary, as the barn or cow-house is frequently made use of for holding it till sold; but it sometimes happens, that in bad markets the wool is kept over the year: in this case a house for it is necessary. There are also added shelter-sheds, and a yard for handling sheep, which may be subdivided by hurdles, as required. Shelter of this kind for ewes in lambing is of great service in bad weather. It is thought, on the whole, that there is as little building as should be erected on a considerable-sized farm of this description.

The probable expense of executing this plan, exclusive of the carriage of materials, and prime cost of stones, will be about L. 410; and, if covered with tiles, L. 322.

No. VIII.—*For a Cottage-Farm of 25 acres.* Two Plans.

* 1.—This design for a cottage farm is plain and simple, and calculated for a country situation, where ornament is not

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required. It is proposed to joist and floor a small piece of the barn, laying the joists about one foot below the top of the walls; this will be found to be very useful, by admitting a draught of air near the bottom of the roof for drying wet corn, winning grass seeds, &c.

To execute this plan, exclusive of the carriage of materials and prime cost of stones, will cost about L. 190; if covered with tiles, about L. 150.

* 2.—This is a plan differently arranged, and on a smaller scale, and may answer the wishes of some individuals better than the other. The different apartments are as small as can well be constructed.

The expense of executing this plan, exclusive of the carriage of materials and prime cost of stones, will cost about L. 164; if covered with tiles about L. 130.

No. IX. is a sketch of a *tank* or *basin* for receiving the water from a set of farm buildings. This sketch is about 44 feet long by 12 feet wide, where it is supposed that the water may enter at A, and the overflowing water discharge itself at B. The sediment is supposed to settle in the basin. The chaff or other dry substances that are difficult to rot, may also be put in here, and it is intended that the size and slope should admit of carts passing through it for carrying off the sediment; on one side a well is supposed to be sunk about 4 feet deep below the bottom of the basin, and the water to be drained from thence through a close grating. A pump is proposed to be put into the well, and to stand as high above the ground, as to throw the water into a barrel on a cart, which may then be taken to the field and discharged on the soil, in the same way as the streets are watered in towns. If the grating should not make the water sufficiently free of mud, a small bundle of wheat straw, well drawn and loosely tied, put up against it, will be found to answer the purpose.

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A hatchway should be made on the top of the well, to admit of a person going down occasionally to clear it out. This sketch is supposed to be on a rocky or gravelly soil; in which case clay-puddle should be put underneath the causeway, and at the back of the walls, in order to retain the water; but in a clay soil this would not be necessary. The situation of it will naturally be at the lowest corner of the offices, and where free access can be obtained to it: and the size or form may vary according to circumstances.

No. X. is a plan of a *gate* for the farm-yards. The east side-pillar is intended for a situation where freestone can be easily obtained; and the west side represents the finishing in a situation where whinstone is only to be got, or where the expense of better finishing is not approved of; or a round pillar may be formed of whinstone. The gate-posts are supposed to be 10 inches in diameter, or in the octagon form, sunk in the ground, as described in the general specifications. And, as it frequently happens that gates into straw-yards are obstructed in their opening, as the courts fill with dung, it is proposed to hang the gate about 9 or 10 inches clear of the surface, and to make up the space between the surface and the gate, by laying a piece of coarse wood below the gate, about 6 or 8 inches in diameter; and this can be taken out when the dung is removed from the court.

A gate put together in this way is very substantial, and easily repaired when any part of it fails. As a means of preserving the gates in spring, when the cattle leave the yards, they should be all taken off, and put into the shed, and remain there till they are again required.

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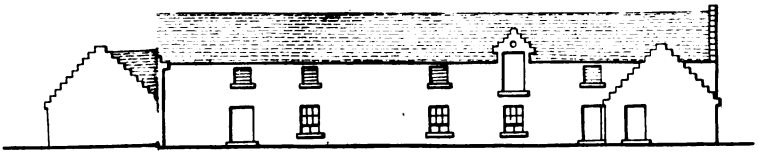
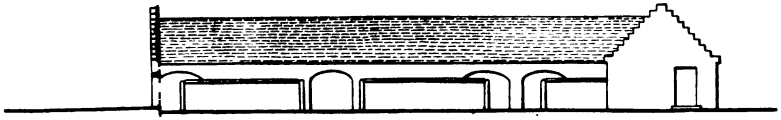
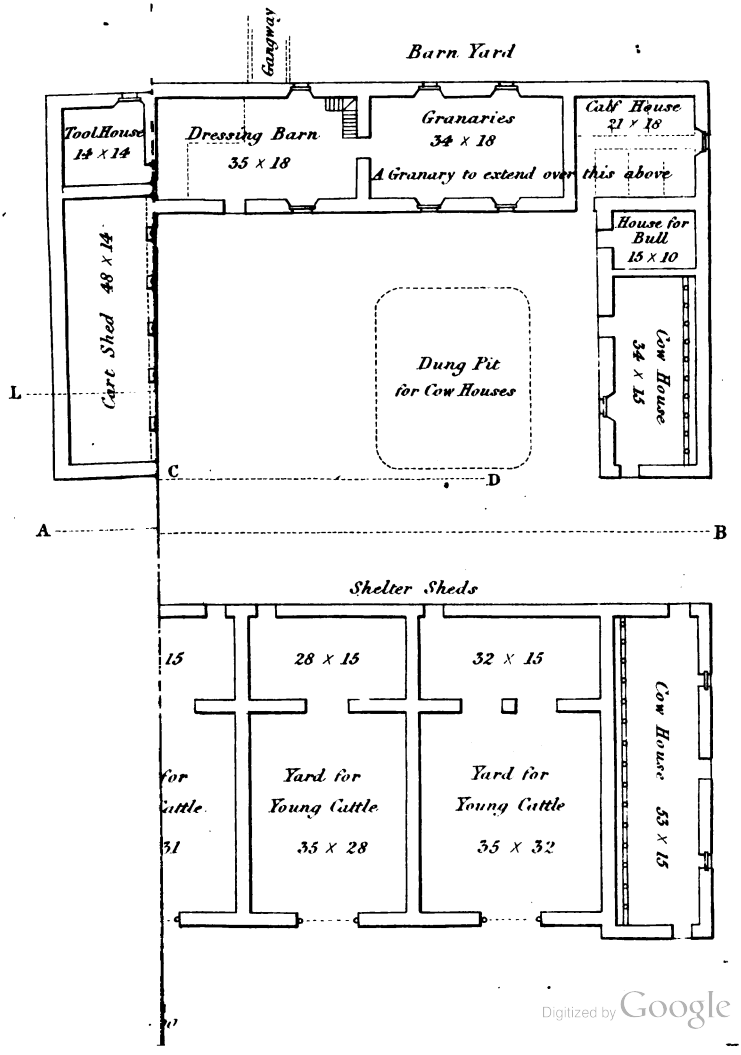
Acres,
kept Breeding, & partly in Feeding Stock.







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LIST OF MEMBERS

OF

THE HIGHLAND SOCIETY OF SCOTLAND

AT 29TH JANUARY 1831,

ALPHABETICALLY ARRANGED, AND DISTINGUISHING THE YEAR OF THEIR ADMISSION.

PRESIDENT,

HIS GRACE WALTER FRANCIS DUKE OF BUCCLEUCH AND QUEENSBERRY, K. T.

The Members marked thus *, have been Presidents; and thus †, Vice-Presidents. Those with § prefixed to their names, are the only *original* constituent Members of the Society now surviving.

New Members are admitted at the General Meetings of the Society by Ballot. There are two such meetings annually, viz. the Anniversary Meeting on the second Tuesday of January, and the Summer General Meeting, on such day in June or July as may be fixed by the Directors, and intimated in terms of the Charter. Members pay an Annual Contribution of £1 : 3 : 6; or, in their option, and in full of all future claims, a Life Subscription of Twelve Guineas.

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LIST OF MEMBERS.

A

		Admitted
*	ARGYLE, His Grace George William, Duke of	1790
†	AIRLY, The Right Hon. David, Earl of	1819
†	ABOYNE, Right Honourable George, Earl of, K. T.	1793
	ABERDEEN, The Right Hon. George, Earl of, K. T.	1805
†	ARBUTHNOT, The Right Hon. John, Viscount of	1803
†	ABERCROMBY, The Right Hon. George, Lord	1799
	ADAM, The Right Hon. William, Lord Chief Commissioner	1816
	ALLAN, The Right Hon. William, *of Glen*, Lord Provost of the City of Edinburgh	1830
	ARBUTHNOT, Major-General the Honourable Hugh, M. P. for Kincardineshire	1811
10	ABERCROMBY, The Hon. George Ralph, *younger of Tullibody*, M. P. for Clackmannanshire	1825
	AGNEW, Sir Andrew, *of Lochnaw*, Bart. M. P. for Wigtonshire	1829
	ABERCROMBY, Sir George, *of Birkenbog*, Bart.	1796
	ANTROBUS, Sir Edmund, *of Rutherford*, Bart.	1829
	Abercromby, Robert, *younger of Birkenbog and Forglen*	1816
	Adair, John, *of Genoch*	1829
	Adam, Rear-Admiral Charles, *of Barns*	1829
	Adam, James, W. S.	1807
	Agnew, Colonel Vans, *of Sheuchan*	1829
	Ainslie, Major-General George	1803
20	Ainslie, P. B. *residing at Donibristle House*	1826
	Aitchison, James, *St Clement's Wells*	1822
	Aitchison, William, *younger of Drummore*	1809
	Aiton, Rev. John, Minister *of Dolphington*	1828
	Alexander, Boyd, 3d son of the late Claud Alexander, *of Ballamyle*	1823
	Alexander, Claud, *of Ballamyle*	1810
	Alexander, Captain James Edward, *late 16th Lancers*	1831

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		Admitted
	Alexander, W. Maxwell, *of Southbar*	1823
	Alison, William, *younger of Westfield*	1826
	Allan, John, *of Linkfield*	1824
30	Allan, Nicol, Manager of Hercules Insurance Company	1812
	Allan, Thomas, *of Laurieston*, Banker, *Edinburgh*	1814
	Allardice, Robert Barclay, *of Urie*	1810
	Allardyce, James, *of Boynsmill*	1830
	Allen, James, Merchant, *Grangemouth*	1815
	Allen, Lieut.-Col. James, *of Inchmartin*	1821
	Allen, John Lee, *of Errol*	1821
	Alston, John, Manufacturer, *Glasgow*	1827
	Alves, Archibald, *late of Springfield*	1797
	Anderson, Adam, LL.D Rector of Perth Academy	1829
40	Anderson, Alex., late Agent at Inverness for Bank of Scotland	1823
	Anderson, David, *of Moredun*	1825
	Anderson, David, *of St Germains*	1829
	Anderson, George, *younger of Gladswood*	1827
	Anderson, James, Deputy Clerk of Justiciary	1820
	Anderson, Major John, *of Candacraig*	1819
	Anderson, John, *of Gladswood*	1819
	Anderson, John, W. S.	1821
	Anderson, Samuel, Wine Merchant	1820
	Andrew, John, *Fettes Row, Edinburgh*	1829
50	Anstruther, Colonel Robert, *Moray Place, Edinburgh*	1799
	Anstruther, James, W. S.	1827
	Arbuthnot, Thomas, *of Meethall*	1829
	Ashworth, Thomas, *of Turton*, Secretary to the Manchester Agricultural Society	1828
	Auld, William, Soap Manufacturer, *Leith*	1821
	Ayton, John, *of Inchdairney*	1821
	Aytoun, Roger, *of Murieston*, W. S.	1820
	Aytoun, Roger, Banker, *Greenock*	1826

B

	BEDFORD, His Grace John, Duke of	1824
*	BUCCLEUCH and QUEENSBERRY, His Grace Walter Francis, Duke of, K. T.	1828
60	BUTE, The Most Noble John, Marquis of	1815
	BUCHAN, The Right Hon. Henry David, Earl of	1811
† §	BREADALBANE, The Right Hon. John, Earl of	1784
	BELHAVEN and STENTON, The Right Hon. Robert Lord	1816

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		Admitted
	BEXLEY, The Right Hon. Nicholas, Lord, Hon. Mem.	1801
	BOYLE, Right Hon. David, Lord Justice-Clerk	1804
	BALGRAY, The Hon. Lord	1800
	BRUCE, Sir Michael, *of Scotstown and Stenhouse*, Bart.	1825
	BAIRD, Dame Ann Preston Campbell, Lady, *of Fernton*	1809
	BAILLIE, Sir William, *of Polkemmet*, Bart.	1818
70	BALLINGALL, Sir George, M. D., Prof. of Military Surgery in the University of Edinburgh	1821
§	BANNATYNE, Sir W. Macleod, *Whiteford House*	1784
	BERESFORD, Admiral Sir John P., Bart., M. P.	1822
	BRISBANE, Lieutenant-General Sir Thomas, *of Brisbane and Makerston*	1801
	Baikie, James, *of Tankerness*	1818
	Baillie, Charles, Advocate	1831
	Baillie, Ewen, *younger of Dochfour*	1824
	Baillie, George, *of Jerviswood*	1800
	Baillie, Lieutenant-Colonel John, *of Leys*, M. P.	1818
	Baillie, Robert Granberry, *of Coulterallars*	1819
80	Bain, Joseph, *younger of Morriston*, Advocate	1826
	Baird, Rev. Dr. George H., Principal of the University of Edinburgh, Chaplain of the Society	1793
	Baird, John, *of Shotts Iron-Works*	1815
	Baird, Thomas Elder, *younger of Forneth*, Advocate	1827
	Bald, Robert, Civil Engineer, *Edinburgh*	1828
	Balfour, Charles, W. S.	1825
	Balfour, Francis, *of Fernie*	1824
	Balfour, James, *of Whittinghame*, M. P.	1821
	Balfour, James, *of Pilrig*, W. S.	1824
	Balfour, John, *of Trenaby*, M. P.	1822
90	Balfour, Major-General Robert, *of Balbirnie*	1830
	Balfour, Captain William, *of Elwick*	1819
	Balfour, William, Merchant, *Glasgow*	1820
	Ballantyne, James, *younger of Castlehill*, Advocate	1822
	Balleny, William, Merchant, *Leith*	1828
	Banks, Robert, *of Craighead, Stirling*	1819
	Bannerman, Charles, *of Crimmonmogate*	1828
	Bannerman, Lieutenant-Colonel John, *late of Madras*	1801
	Bannerman, Patrick, Advocate, *Aberdeen*	1825
	Barker, John, Surgeon, *Edinburgh*	1821
100	Barns, Major-General James Stevenson, *of Kirkhill*	1803
	Bartlemore, Alexander, *of Seabrae*	1825
	Bayley, Isaac, Writer, *Edinburgh*	1828
	Bayne, Dr James, Physician, *Inverness*	1813

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		Admitted
	Beatson, David, *of Kirkpottie*	1828
	Beatson, H. Dundas, Captain, Swift Revenue Cutter	1809
	Beatson, Thomas, *of Mawhill*	1829
	Beattie, Thomas, *of Cruive*	1821
	Beith, John, Banker, *Campbletown*	1826
	Belches, Alexander Hepburn Murray, *of Invermay*	1824
110	Belches, Major John H. Murray, *at Invermay*	1825
	Bell, Carlyle, W. S. one of the Principal Clerks of the City of Edinburgh	1824
	Bell, Geo. Jos. Professor of the Law of Scotland, University of Edinburgh	1802
	Bell, George, Surgeon, *Edinburgh*	1804
	Bell, George, Merchant, *Leith*	1826
	Bell, James, *of Woodhouselees, Leith*	1803
	Bell, John *of Dunaby*	1821
	Bell, Robert, Advocate	1823
	Bell, William, W. S.	1813
	Berry, William, *of Tayfield*	1800
120	Bertram, Gilbert, Merchant, *Leith*	1805
	Bertram, William, Merchant, *Leith*	1805
	Bertram, William, *at Cranshaws*	1826
	Berwick, William, Brewer, *Edinburgh*	1821
	Bethune, Gilbert, *of Balfour*	1806
	Beveridge, Thomas, Depute Clerk of Session	1816
	Binning, David Monro, *of Softlaw*, one of the Commissioners of the Customs, London	1799
	Black, John, *of Ardmarnock*	1819
	Blackburn, John, *of Killearn*	1827
	Blackwood, William, Bookseller, *Edinburgh*	1830
130	Blaikie, James, Advocate, *Aberdeen*	1825
	Blair, David Anderson, *of Inchyra*	1819
	Blair, David, *of Cookston*	1809
	Blair, David, *younger of Cookston*	1826
	Blair, Forbes Hunter, *of Dunskey*	1808
	Blair, James, *of Penninghame*, M. P.	1827
	Blair, William, *of Blair*, M. P. for Ayrshire	1821
	Blair, William, *of Avonton*	1817
	Bogue, Adam, *of Woodhall*	1822
	Bonar, Andrew, Banker, *Edinburgh*	1824
140	Bonar, John, *of Kimmerghame*, Banker, *Edinburgh*	1818
	Bonar, John, *of Ratho*	1822
	Bonar, William, Banker, *Edinburgh*	1828
	Bontine, R. Cunningham, *of Ardoch*	1823

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		Admitted
	Borthwick, George Augustus, M. D., *Edinburgh*	1817
	Borthwick, John, *of Crookston*	1812
	Borthwick, William Hay, *of Hopesrig*	1821
	Boswall, Captain John Donaldson, R. N.,	1814
	Boswell, John, *of Kingcausie and Balmuto*	1823
	Boswell, William, Advocate, Sheriff of Berwickshire	1803
150	Bowie, John, *of Camsiscan*, W. S.	1815
	Boyd, Edward, *of Mertonhall*	1813
	Boyd, John, *of Broadmeadows*	1804
	Boyle, Colonel John, *of Shewalton*	1801
	Braidwood, William, Manager of the Marine Insurance Company	1807
	Brander, Lieut.-Colonel James, *of Pitgaveny*	1827
	Brander, James, Banker, *Golspie*	1830
	Bremner, Charles, W. S.	1800
	Briggs, Major John Falconer, *of Strathairly*	1828
	Brodie, Alexander, *Barnie Mains*	1822
160	Brodie, John, *of Scoughall*	1822
	Brodie, Wm., *of Brodie*	1821
	Brodie, William, *Upper Keith*	1822
	Brown, Alex., Merchant, *Aberdeen*	1825
	Brown, George, *of Blairfield*	1828
	Brown, Hugh, *of Broadstone, Ayrshire*	1823
	Brown, Lieutenant J. D., *Markle, East Lothian*	1821
	Brown, James, Architect, *Edinburgh*	1815
	Brown, James, Accountant, *Edinburgh*	1816
	Brown, John, *of Coultermains*	1807
170	Brown, John Osborn, W. S.	1799
	Brown, Peter, *at Linkwood, Elgin*	1821
	Brown, Robert, Factor on the Estate of Hamilton	1802
	Brown, Capt. Samuel, R. N., *residing at Inverleith-House*	1829
	Brown, Walter, Merchant, *Edinburgh*	1828
	Brown, William, Merchant, *Glasgow*	1828
	Browne, Isaac Hawkins, Honorary Member	1798
	Bruce, John, *younger of Sumburgh*	1829
	Bruce, Oneziphorous Tyndall, *of Falkland*	1829
	Bruce, Robert, *of Symbister, Zetland*	1807
180	Bruce, Robert, *of Kennet*	1819
	Bruce, Robert, Advocate, Sheriff of Argyllshire	1828
	Bruce, Thomas, *of Arnot*, late one of the Commissioners of Customs for Scotland	1820
	Bruce, Thomas, *of Langlee*, W. S.	1828

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		Admitted
	Bryce, Rev. James, D. D. Minister of the Scots Church, *Calcutta*	1813
	Buchan, George, *of Kelloe*	1826
	Buchan, Robert, *George Street, Edinburgh*	1817
	Buchanan, Alexander, *Arnprior*	1819
	Buchanan, Andrew Carrick, *at Drumpellier*	1827
	Buchanan, Archibald, *of Auchintorlie*	1828
190	Buchanan, David Snodgrass, *of Cuninghamhead*	1803
	Buchanan, the Rev. George Craig, *of Mackeanston*	1814
	Buchanan, George, *of Finnich Melise*	1830
	Buchanan, Jas. *late of Buenos Ayres, residing at Edinburgh*	1820
	Buchanan, John, *of Ardoch*	1805
	Buchanan, John Cross, *of Auchinstoshan*	1824
	Buchanan, John, Wine Merchant, *Glasgow*	1827
	Buchanan, John, *at Finnich*	1831
	Buchanan, Peter, *of Auchmar*	1818
	Buchanan, Robert Carrick, *of Drumpellier*	1827
200	Buchanan, Robert, *Glasgow*	1811
	Buchanan, William, Merchant, *Glasgow*	1828
	Burn, James, W. S.	1825
	Burn, William, Architect, *Edinburgh*	1824
	Burnett, John, *of Kennay*	1809
	Burnett, Lieutenant-General William, *of Banchory Lodge*	1813
	Burnett, Thomas, *younger of Leys*	1824
	Burnett, Thomas, Advocate, *Aberdeen*	1825
	Burt, Dr Robert, Physician, *Edinburgh*	1813
	Burt, John, Surgeon, *Edinburgh*	1831
210	Butter, Archibald, *of Faskally*	1825

C

	CAITHNESS, The Right Hon. Alexander, Earl of	1814
†	CASSILLIS, The Right Hon. Archibald, Earl of, K. T.	1793
†	CATHCART, General, Right Hon. William, Earl of, K. T.	1807
	CAWDOR, The Right Hon. John Frederick, Earl of	1831
	CAMPBELL, The Right Hon. Lord John	1798
	CRAIGIE, The Honourable Lord	1791
	CRINGLETIE, The Honourable Lord	1806
	COREHOUSE, The Honourable Lord	1819
	COCHRANE, Admiral the Hon. Sir A. Inglis, Bart. G. C. B.	1816
220	CATHCART, Colonel the Hon. Frederick Macadam, *of Craigengillan*	1830
	CARMICHAEL, Sir Thomas Gibson, *of Castlecraig*, Bart.	1806

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		Admitted
	CAMPBELL, Sir W. P. Hume, *of Marchmont*, Bart.	1817
	CUNNINGHAME, Colonel Sir James Montgomery, *of Fearness*, Bart.	1807
	CLERK, Sir Geo. *of Penicuik*, Bart. M. P. for Edinburghshire	1812
	COLQUHOUN, Sir James, *of Luss*, Bart.	1801
	CAMPBELL, Sir Archibald, *of Succoth*, Bart.	1813
	CAMPBELL, Sir John, *of Airds*, Bart.	1787
	CAMERON, Sir Duncan, *of Fasfern*, Bart.	1800
	CAMPBELL, Major-General Sir Colin, K. C. B.	1816
230	COCHRANE, Captain Sir Thomas, Royal Navy, K. C. B.	1817
	CAMPBELL, Sir James, G. C. B.	1797
	Caird, James, *of Drumfad*	1814
	Calderwood, Thomas Durham, *of Polton*	1822
	Callender, James Henry, *of Craigforth*	1830
	Callender, William Burn, *of Prestonhall*	1818
	Cameron, Alexander, *Surinam*	1819
	Cameron, Allan, *North Uist*	1803
	Cameron, Colonel Donald, *of Locheil*	1793
	Cameron, Donald Charles, *of Foxhall*	1825
240	Cameron, Gordon, *of Letterfindlay*	1806
	Cameron, John, *Corrychoiley and Gleneaves*	1826
	Cameron, Lieutenant-Colonel Robert, *late of Madras*	1804
	Cameron, William Mouat, *Castle Street, Edinburgh*	1830
	§ Campbell, General Alexander, *of Monzie*	1784
	Campbell, Lieutenant-Colonel Alexander, *of Ballochyle*	1807
	Campbell, Lieutenant-Colonel Alexander, *of Possill*	1810
	Campbell, Captain Alexander, *of Brackley*	1806
	Campbell, Alexander, *late of Tobago*	1799
	Campbell, Alexander, *Greenock*	1804
250	Campbell, Alexander, *of Elderline*	1807
	Campbell, Alexander, *of Strond*	1829
	Campbell, Alexander Brodie, *of Fornighty*, Hon. East India Company's Service	1816
	Campbell, Archibald, *of Jura*	1789
	Campbell, Archibald, *of Blythswood*, M. P.	1800
	Campbell, Archibald, *of Drumsainey*	1808
	Campbell, Archibald, *of Catrinebank*	1810
	Campbell, Archibald, *of Askomel*, Captain Royal Artillery	1810
	Campbell, Captain Archibald, Chamberlain to his Grace the Duke of Argyll	1811
	Campbell, Archibald James, *of Kilpatrick*	1824
260	Campbell, Archibald, *of Glendaruel*	1826
	Campbell, Arthur, W. S.	1816

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		Admitted
	Campbell, Charles, *of Combie*	1808
	Campbell, Colin, *Albyn Place, Edinburgh*	1810
	Campbell, Colin, *at Posill*	1829
	Campbell, Major Donald, *of Knock*	1806
	Campbell, Donald, *of Dunstaffnage*	1823
	Campbell, Dougald, *of Ballinaby*	1793
§	Campbell, General Duncan, *of Lochnell*	1784
	Campbell, Dugald, *of Kildaloig*	1813
270	Campbell, Dugald, *of Illandrie*	1805
	Campbell, Major Dugald, Royal Artillery	1818
	Campbell, Duncan, *of Ross*	1823
	Campbell, Duncan, *late at Ardgower*	1802
	Campbell, Henry Fletcher, *of Boquhan*	1823
	Campbell, James Muir, *Ayr*	1825
	Campbell, James, *younger of Jura*	1827
	Campbell, Colonel James, *late of Madras*	1801
	Campbell, James, *younger of Craigie*, Advocate	1824
	Campbell, John, *of Craignure*,	1803
280	Campbell, John, *of Stonefield*	1808
	Campbell, John, *of Glen Saddel*	1817
	Campbell, John, *of Blairhall*	1819
	Campbell, John, *of Southhall*	1821
	Campbell, John, *younger of Otter*	1827
	Campbell, John, *of Strachur*	1829
	Campbell, Lieutenant-Colonel John, H. E. I. C. Service	1817
	Campbell, Colonel John *of Blackhall*	1803
	Campbell, John Archibald, W. S.	1813
	Campbell, John, *of Carbrook*, W. S.	1793
290	Campbell, John, *of Lincoln's Inn*	1800
	Campbell, John, W. S. *now of London*	1787
	Campbell, John, *late of Lockend*	1803
	Campbell, John, *younger of Airds*	1829
	Campbell, Lorne, Factor to the Duke of Argyle *at Roseneath*	1824
	Campbell, Mungo Nutter, *of St Catherine's*	1824
	Campbell, Captain Patrick, *of Inveraw*	1799
	Campbell, Rear-Admiral Patrick	1819
	Campbell, Captain Peter, H. E. I. C. Naval Service	1819
	Campbell, Richard, *of Craigie*	1829
300	Campbell, Major-General Robert, *of Kintarbert*	1789
	Campbell, Robert Nutter, *of Kailzie*	1798
	Campbell, Robert, *of Sonochan*	1802
	Campbell, Robert, *younger of Auchmannock*	1816

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		Admitted
	Campbell, Rose, *late of Spain*	1809
	Campbell, Walter Frederick, *of Ilay*, M. P. for Argyleshire	1817
	Campbell, Walter, *of Sunderland*	1818
	Campbell, William, *of Netherplace*	1810
	Campbell, William, W. S.	1805
	Canning, James, *residing at Shiels*	1813
310	Carmichael, Maurice, *of Eastend*	1827
	Carmichael, Michael, *younger of Eastend*	1825
	Carnegie, David, *of Craigo*	1825
	Carnegy, William Fullarton, *of Boysack*	1824
	Carnegy, James, *of Balnamoon*	1813
	Carruthers, Alexander, *of Warmanbie*	1826
	Carruthers, Lieutenant-Colonel J., *of Denby*	1824
	Carruthers, William Thomas, *of Dormont*	1823
	Cassels, David, *younger of Arnprior*	1824
	Cathcart, Elias, *of Alloway*, Advocate	1819
320	Cathcart, James, Merchant, *Leith*	1805
	Cathcart, John, *of Genoch*	1803
	Chalmers, Alexander, *of Cluny and Knockorth*	1826
	Chalmers, Charles, *of Monkshill, Aberdeen*	1824
	Chalmers, Lieutenant-Colonel W., *of Glenericht*	1822
	Chancellor, Alexander, *of Shieldhill*	1818
	Cheape, Major John, *Edinburgh*	1814
	Cheine, Patrick, *Great King Street, Edinburgh*	1820
	Cheyne, Captain Alexander, Royal Engineers, *Edinburgh*	1825
	Cheyne, James Auchinleck, *of Oxendean*, W. S.	1825
330	Chisholm, Lachlan, *of Irin*	1831
	Christie, Andrew, *of Ferrybank*	1813
	Christie, Robert, Accountant, *Edinburgh*	1824
	Clark, Robert, *of Comrie*	1810
	Clason, Andrew, W. S.	1820
	Cleghorn, George, *of Weens*	1821
	Cleland, James, L L. D. Superintendent of Public Works, *Glasgow*	1827
	Clunes, Major William, *of Cracaig*	1820
	Cochrane, William, *of Ladyland*	1815
	Cockburn, Patrick, Accountant, *Edinburgh*	1824
340	Colquhoun, James, *younger of Luss*	1829
	Colquhoun, John Campbell, *of Clathick and Killermont*	1824
	Colquhoun, John, Sheriff of Dumbartonshire	1807
	Connel, James, *Leith*	1804
	Connell, James, *of Conheath*	1828
	Cooper, Samuel, *of Ballindallock*	1818

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		Admitted
	Corrie, Thomas, *of Culloch*, Manager British Linen Co.	1826
	Couper, Peter, W. S.	1811
	Cowan, Alexander, Merchant, *Edinburgh*	1810
	Cowan, Duncan, Merchant, *Edinburgh*	1810
350	Craig, Alexander, Merchant, *Edinburgh*	1818
	Craig, Alexander, *Kirkton*	1821
	Craig, John, Merchant, *Edinburgh*	1818
	Craig, William Gibson, *younger of Riccarton*	1824
	Craigie, Lawrence, *of Glendoick*	1824
	Craik, Douglas H., *of Arbigland*	1822
	Crawford, Charles, *East Fortune*	1822
	Crawford, John Innes, *of Bellfield*	1815
	Crawford, John, Duncan Street, *Newington*	1826
	Crawford, John, *of Auchinames*	1818
360	Crawford, William Macknight, *of Cartsburn*	1809
	Crawford, William Howison, *of Crawfordland*	1809
	Crawfurd, John, late British Resident at Java	1819
	Crichton, Thomas, *of Auchinskeoch*, Advocate, Chamberlain to the Duke of Buccleuch	1795
	Crighton, John, *of Friarscarse*	1830
	Crombie, Alexander, *of Phesdo*	1827
	Crow, James, *at Kincraig*	1826
	Cruickshanks, James, *of Langleypark*	1829
	Cumming, Charles Lennox, *of Roseile and Kinnaird*	1817
	Cunningham, Colonel John, *of Newton*	1829
370	Cunningham, John, *of Duchrae*	1830
	Cunningham, William, *of Lainshaw*	1810
	Cunningham, William, *at Goodleyburn*	1830
	Cunninghame, William, *of Craigends*	1828
	Curle, William, *of Eastfield*	1821
	Cuthbertson, Archibald, *Peanston*	1822
	Cuthbertson, Donald, Accountant, *Glasgow*	1827
	Cuthbertson, James, *Seton Mains*	1824

D

†	DALHOUSIE, Lieutenant-General the Right Hon. George, Earl of, G. C. B.	1804
§	DUFFUS, The Right Hon. Benjamin, Lord	1784
380	DOUGLAS, The Right Hon. Archibald, Lord	1825
	DUNDAS, The Right Hon. Lawrence, Lord	1800
	DUNDAS, The Right Hon. Wm. M.P. Lord Clerk-Register	1801
	DUFF, Lieutenant-General the Hon. Alexander, M.P.	1814
	DOUGLAS, Hon. Charles, *of Douglas*, M. P. for Lanarkshire	1806

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		Admitted
	DALYELL, Sir James, *of Binns*, Bart.	1798
	DENHAM, General Sir James Stewart, *of Coltness*, Bart.	1800
	DALRYMPLE, Lieutenant-General Sir John Hamilton *of Cranston and Cousland*, Bart.	1817
	DUNBAR, Sir Archibald, *of Northfield*, Bart.	1794
	DICK, Sir Robert Keith, *of Prestonfield*, Bart.	1816
390	DOUGLAS, Sir J. Scott, *of Springwood Park*, Bart.	1823
	DUNBAR, Sir James, *of Boath*, Bart., R. N.	1802
	DUNDAS, Sir Robert, *of Dunira*, Bart.	1793
	DRUMMOND, Sir F. Walker, *of Hawthornden*, Bart.	1823
	DURHAM, Vice-Adm. Sir P. Henderson, *of Fordel*, G.C.B.	1823
	DALLAS, Major-General Sir Thomas, Knight	1805
	D'ESTE, Colonel Sir Augustus Frederick	1822
	Dallas, James, Merchant, *Edinburgh*	1819
	Dalrymple, Major-General John, *of North Berwick*	1823
	Dalyell, John, *of Lingo*	1823
400	Dalyell, John Graham, Advocate	1807
	Darling, Thomas, S. S. C.	1821
	Darroch, Lieutenant-General Duncan, *of Gourock*	1830
	Daubeny, Robert Henry, *of Bristol*	1826
	Davidson, Duncan, *of Tulloch*,	1824
	Davidson, Duncan, *of Tillychetly*	1824
	Davidson, Henry, *Haddington*	1809
	Davidson, James Gillespie, W. S.	1819
	Davidson, James, *Milnholm*, Factor to his Grace the Duke of Buccleuch	1828
	Davidson, John James, W. S.	1824
410	Davidson, Laurence, W. S.	1829
	Davidson, Robert, Advocate	1819
	Davidson, William, *of Hatton*	1809
	Dempster, George, *of Skibo*	1823
	Dennistoun, James, *of Dennistoun*	1822
	Dennistoun, James, *younger of Dennistoun*	1829
	Dennistoun, James, *of Golfhill*, Banker, *Glasgow*	1827
	Dewar, John, Advocate	1830
	Dick, David, *of Glenshiel*	1814
	Dick, John, Advocate	1827
420	Dick, Colonel, R. H., *of Tullimet*	1828
	Dick, William, *younger of Pitkarro*	1828
	Dickson, Andrew, *of Alton*	1823
	Dickson, Archibald, *of Huntlaw*	1823
	Dickson, George, late Merchant, *Calcutta*	1830
	Dickson, John, *of Kilbucho and Hartree*	1802

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		Admitted
	Dickson, Walter, Merchant, *Edinburgh*	1807
	Dillon, John, *Glasgow*	1800
	Dixon, John, *of Daldowie*, Merchant, *Glasgow*	1827
	Dixon, William, *of Govan*, Merchant, *Glasgow*	1827
430	Don, General Alex., Lieutenant-Governor of Gibraltar	1804
	Donaldson, John, *of Aucharn*, W. S.	1812
	Douglas, Archibald, *of Adderstone*	1822
	Douglas, Archibald, Advocate	1823
	Douglas, George, Advocate, Sheriff of Kincardineshire	1800
	Douglas, John, *of Lockerby*	1825
	Douglas, Robert, *of Bridgeton*	1831
	Douglas, Lieut.-Col. William, late of the 85th Regiment	1803
	Douglas, William Robert Keith, M. P.	1819
	Downie, Robert, *of Appin*	1814
440	Dron, William, *of Blackruthven*	1829
	Drummond, Rear-Admiral Adam, *of Megginch*,	1822
	Drummond, George Harley, *late of Drumtochty*	1810
	Drummond, Henry Home, *of Blair Drummond*, M. P. for Stirlingshire	1809
	Drummond, Thomas, *younger of Newton*	1828
	Dudgeon, Alexander, *of St Helen's*	1826
	Dudgeon, Patrick, *of Eastcraigs*, W. S.	1827
	Dudgeon, Robert, Merchant, *Leith*	1828
	Dudgeon, William, Merchant, *Leith*	1826
	Duff, Adam, Advocate, Sheriff of Edinburgh	1813
450	Duff, Garden, *of Hatton*	1814
	Duff, James Grant, *of Eden*	1828
	Duff, Robert William, *of Fetteresso*	1804
	Duff, Robert, *younger of Fetteresso*	1823
	Duff, Richard Wharton, *of Orton*, Comptroller of Excise	1805
	Dunbar, Major P., 3d Regiment of Bengal Cavalry	1823
	Duncan, Alexander, *of Glendivine*	1824
	Duncan, Andrew, M. D. *Edinburgh*	1808
	Duncan, James, *at Cargill*	1826
	Duncan, James, Merchant, *Leith*	1826
460	Duncan, James J., *of Garthamlock*	1830
	Dundas, David, *younger of Dunira*	1828
	Dundas, Gabriel Hamilton, *of Duddingston*	1823
	Dundas, James, *of Dundas*, Vice-Lieut. of West Lothian	1827
	Dundas, Robert, *of Arniston*	1820
	Dundas, Robert Adam, M. P.	1825
	Dunlop, Alexander, Advocate	1828
	Dunlop, Archibald, Distiller, *Haddington*	1823

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		Admitted
	Dunlop, Lieutenant-General James, *of Dunlop*	1818
	Dunlop, James, *of Annanhill*	1824
470	Dunlop, James, W. S.	1823
	Dunlop, John Colin, Advocate, Sheriff of Renfrewshire	1824
	Dunlop, William, Merchant, *Edinburgh*	1820
	Dunn, William, *of Kilbowie*, Merchant, *Glasgow*	1827
	Dunsmure, James, Secretary Herring Fishery Board	1817
	Durham, Lieutenant-General James, *of Largo*	1823

E

†	ELGIN & KINCARDINE, The Right Hon. Thomas, Earl of, K. C.	1818
†	ELCHO, The Right Hon. Francis, Lord	1819
§	ELDIN, The Honourable Lord	1784
	ELLIOT, Sir William, *of Stobbs*, Bart.	1823
480	EDMONSTONE, Sir Archibald, *of Duntreath*, Bart.	1821
	ELPHINSTONE, Sir Robert Dalrymple Horn, *of Logie-Elphinstone*, Bart.	1813
	Eddington, James, *of Gargunnock*	1814
	Eddington, Thomas, Merchant, *Glasgow*	1813
	Edmonstone, Archibald, *of Spittal*	1819
	Edmonstone, James, *of Newton*	1798
	Elder, John, Merchant, *Slate*	1815
	Elliot, George Scott, *of Larriston*	1813
	Elliot, James, *of Wolflie*	1826
	Elliot, Theodore F., *at Braco Castle*, Captain Engineers H. E. I. C. S.	1824
490	Ellis, William, S. S. C.	1821
	Elphinstone, Lieutenant-Colonel John	1827
	Erskine, James, *of Cambus*	1808
	Erskine, John James, *Clathic*, late one of the Members of Council Prince of Wales Island	1823
	Erskine, Col. William Howe Knight, *of Pitodrie*	1820
	Ewing, James, L L. D. *of Dunoon Castle*, Merchant, *Glasgow*	1827
	Ewing, Robert, Merchant, *Greenock*	1830

F

†	FIFE, The Right Hon. James, Earl of, K. T., G. C.B.	1805
	FINGAL, The Right Hon. the Earl of	1810
	FORBES, The Right Hon. James Ochonchar, Lord	1831
500	FLEMING, Vice-Admiral the Hon. Charles Elphinstone, *of Biggar and Cumbernauld*	1824

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		Admitted
	FLAHAULT, Charles, Count Mercer De	1821
	FERGUSON, Sir James, *of Kilkerran*, Bart.	1805
	FETTES, Sir William, *of Comely Bank*, Bart.	1801
	FORBES, Sir Charles, *of New and Edinglassie*, Bart. M. P.	1814
	FORBES, Sir John Stuart, *of Pitsligo and Fettercairn*	1830
	FOULIS, Sir James, *of Woodhall*, Bart.	1816
	FERGUSON, Sir Adam, Knight, Keeper of the Regalia	1799
	Fairbairn, T., *late of St Vincent's*	1802
	Fairlie, James, *of Holmes*	1827
510	Falconar, David, *of Carlowrie*	1807
	Falconer, Æneas, *Blackhills*	1810
	Falconer, Cosmo, *of Hartwoodhill*	1805
	Falconer, Peter, *at Craigelachie*	1821
	Farquhar, Lieutenant-Colonel William, Madras Engineers, late British Resident at Singapore	1827
	Farquhar, Captain, R. N. C. B.	1826
	Farquharson, Andrew, *of Breda*	1800
	Farquharson, Archibald, *of Finzean*	1815
	Farquharson, Major-Gen. James Alexander, 25th Regiment	1819
	Farquharson, James, *of Invercauld*	1831
520	Farquharson, John, *of Haughton*	1808
	Farrie, John, Chief Magistrate, *Greenock*	1831
	Ferguson, George, *of Pitfour*	1828
	Ferguson, James, *of Kinmundy*	1826
	Ferguson, John, *of Stronvar*	1805
	Ferguson, John, *of Knockindale*	1824
	Ferguson, Robert, *of Raith*	1825
	Ferguson, Robert Cutlar, *of Craigdarroch*, M. P.	1826
	Ferguson, Thomas, W. S.	1821
530	Fergusson, Adam, *of Woodhill*	1807
	Fergusson, Major-General Archibald, *of Dunfallandie*	1824
	Fergusson, Charles, *younger of Kilkerran*, Advocate	1826
	Fergusson, James, *of Crosshill*, Principal Clerk of Session	1800
	Fergusson, James, W. S.	1826
	Fergusson, Lieutenant-Colonel James, *of Huntly Burn*	1831
	Fergusson, John, Wine-Merchant, *Leith*	1826
	Ferrie, Robert, *of Blairtummock*	1827
	Ferrier, John, W. S.	1796
	Ferrier, Louis H., *of Belleside*	1825
540	Finlay, Kirkman, *of Castle Toward*	1814
	Finlay, James, *younger of Castle Toward*	1826
	Finlay, William Warwick, *younger of Trees*	1826

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		Admitted
	Fisher, Daniel, S. S. C.	1819
	Fisher, James, M. D., late Staff Surgeon to the Army in Canada	1821
	Fleming, Robert, *Minto Street, Edinburgh*	1829
	Flemyng, Robert Stewart, *of Killiechassie*	1826
	Fletcher, Angus, *of Dunans*, Advocate	1826
	Fletcher, John, *of Bernice*	1826
	Fletcher, Miles A., Advocate	1819
550	Flyter, Robert, Sheriff-Substitute Fort William	1821
	Forbes, Alexander, *of Inverernan*	1822
	Forbes, Alexander Irvine, *of Chivas*	1805
	Forbes, Charles, *of Asloun*, second son of Sir Charles Forbes, Bart. M. P.	1828
	Forbes, Rev. Dr George, *of Blelack*	1803
	Forbes, George, Banker, *Edinburgh*	1817
	Forbes, George, *of Auchnagathil*, third son of Sir Charles Forbes, Bart. M. P.	1830
	Forbes, James Stewart, fourth son of Sir Charles Forbes, Bart. M. P.	1830
	Forbes, John, *younger of New and Edinglassie*, M. P.	1828
	Forbes, Michie, *of Crimond*	1806
560	Forbes, Major-General Nathaniel, *of Auchernach*	1828
	Forbes, William, *of Callander*	1830
	Fordyce, Thomas G., *of Ayton*	1828
	Forman, John, W. S.	1809
	Forman, John Nairne, W. S.	1831
	Forrest, James G., *of Comiston*	1805
	Forsyth, Alexander, S. S. C.	1798
	Forsyth, John, *Forres*	1826
	Fotheringham, Thomas Ogilvie, *of Powrie*	1824
	Fouler, James, *of Raddrey*	1806
570	Fraser, Alexander, *of Inchcoulter*	1805
	Fraser, Alexander, Merchant, *Aberdeen*	1817
	Fraser, Captain Alexander, Royal Engineers	1818
	Fraser, Archibald Thomas Frederick, *of Abertarff*	1820
	Fraser, Colonel Charles, *of Inverallochy and Castle Fraser*	1816
	Fraser, George, Merchant, *Manchester*	1825
	Fraser, Hugh, *of Eskadale*	1819
	Fraser, James Bristow, *of Gorthleck*	1807
	Fraser, James, *Redcastle House*	1807
	Fraser, John, Cashier, *Cullen House*	1812
580	Fraser, John, Advocate	1802
	Fraser, Robert, *of Torbreck*	1802

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		Admitted
	Fraser, Simon, *of Foyers*	1800
	Fraser, Simon, *of Ford*, Advocate	1828
	Fraser, Captain Thomas, R. N.	1817
	Fraser, Thomas Alexander, *of Lovat*	1820
	Fraser, Captain William, *residing at Brackla*	1809
	Fraser, William, *of Glenmead*, W. S.	1816
	Fullarton, Colonel S. M., *of Fullarton*	1825
	Fullarton, John, *of Demerara, Brisbane House*	1825
590	Fullerton, Captain James, 30th Regiment	1824
	Fullerton, John, *of Kilmichael*	1807
	Fullerton, William, *of Skeldon*, Advocate	1801
	Fyfe, Andrew, M. D., *Edinburgh*	1823
	Fyffe, James, *of Smithfield*	1806

G

	† GORDON, His Grace George, Duke of, G. C. B.	1791
	GRAHAM, The Most Noble James, Marquis of	1821
	GALLOWAY, The Right Hon. George, Earl of, K. T.	1807
	† § GLASGOW, The Right Honourable George, Earl of	1784
	† GOWER, The Right Honourable George, Earl	1813
600	† GRAY, The Right Honourable Francis, Lord	1793
	† GLENLYON, The Right Honourable James, Lord	1804
	† GLENORCHY, The Right Honourable John, Viscount	1819
	GARLIES, The Right Honourable Viscount, M. P.	1830
	GREENOCK, the Right Honourable Charles, Lord	1809
	GOWER, The Right Hon. Lord Francis Leveson, M. P., *for Sutherlandshire*	1822
	GRAHAM, The Right Hon. Sir James Robert George, of *Netherby*, Bart. M. P. First Lord of the Admiralty,	1830
	GORDON, Captain the Honourable William, R. N., M. P. *for Aberdeenshire*	1824
	GRANT, The Right Honourable Charles, M. P. *for Inverness-shire*	1816
	GRANT, Colonel The Honourable Francis William *of Grant*, M. P. *for Morayshire*	1803
610	GRAY, The Hon. John, eldest son of Lord Gray	1821
	GILLIES, The Honourable Lord	1809
	GORDON, Sir James, *of Letterfourie*, Bart.	1800
	GORDON, Sir John, *of Earlston*, Bart.	1827
	GORDON, Sir William Cumming, *of Altyre and Gordonston*, Bart.	1808
	GIBSON, Sir Alexander C. Maitland, *of Cliftonhall*, Bart.	1818

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		Admitted
	GRANT, Sir John Peter, *of Rothiemurchus*, Knight, one of the Judges of the Supreme Court, *Bombay*	1792
	Galbraith, William, *younger of Blackhouse*, Town-Clerk, *Stirling*	1822
	Galbreath, David Stewart, *of Machrihanish*	1812
	Galloway, William, Accountant, *Edinburgh*	1814
620	Garden, Alexander, Merchant, *Glasgow*	1827
	Gardiner, George, Writer, *Perth*	1828
	Gardiner, John, *at Smithston*	1830
	Garioch, John, *of Heathcote*	1826
	Gartshore, John Murray, *of Gartshore*	1825
	Geddes, Adam G. *Airfield, Dalkeith*	1819
	Gibbons, Edward, Factor to Macleod *of Macleod*	1830
	Gibson, John, W. S.	1825
	Gibson, John *jun.* W. S.	1828
	Gibson, Rev. Thos. *of Glencrosh*, Minister of Lochmaben	1823
630	Gilchrist, Dugald, *of Ospisdale*	1817
	Gillanders, John, *of Highfield*	1800
	Gillespie, Alexander, Surgeon, *Edinburgh*	1806
	Gillespie, George, *of Biggar Park*	1829
	Gillespie, James, *of Parkhall*	1829
	Gillespie, Robert, Merchant, *London*	1829
	Gillespie, Thomas, *of Ardochy*	1821
	Gillespie, William, *Gateside*	1829
	Gillon, William Doune, *of Wallhouse*	1823
	Gilmour, Walter James Little, *of Craigmillar*	1828
640	Gilzean, Thomas, *of Bunachton*	1813
	Glasford, James, *of Dugaldstone*, Advocate	1806
	Goalen, Alexander, *of Leith*	1805
	Goldie, Alexander, W. S.	1822
	Goldie, Archibald W., W. S.	1828
	Goodwin, Lieutenant-Col. Hugh Maxwell *of Mount Alyn, Denbighshire*	1830
	Gordon, Lieut.-Col. Alex., late Sutherland Highlanders	1801
	Gordon, Captain Alexander, R. N.	1820
	Gordon, Alexander, *of Auchlunies*	1808
	Gordon, Alexander, *Great King Street, Edinburgh*	1817
650	Gordon, David, *of Abergeldie*	1822
	Gordon, George, Factor for His Grace the Duke of Gordon, *at Huntly*	1829
	Gordon, Lieutenant-Colonel George, *of Invertromie*	1825
	Gordon, James, *of Culvenan*, one of the Commissaries of Edinburgh	1798

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		Admitted
	Gordon, James Farquhar, *of Locharwoods*, W. S.	1804
	Gordon, James, *of Revack*	1813
	Gordon, Colonel John, *of Cluny*, M. P.	1807
	Gordon, John David, *younger of Wardhouse*	1828
	Gordon, John, W. S.	1802
	Gordon, John, *of Swinzie*	1807
660	Gordon, John, *of Cairnbulg*, Advocate	1811
	Gordon, John, *of Aikenhead*	1814
	Gordon, John, *of Corstoun*	1829
	Gordon, John, late Major of the 2d or Queen's Regt.	1822
	Gordon, John Taylor, W. S.	1831
	Gordon, Joseph, W. S.	1804
	Gordon, Lewis, one of the Depute-Secretaries of the Society	1799
	Gordon, Michael, *younger of Abergeldie*	1831
	Gordon, Robert, *of Jamaica*	1802
	Gordon, Thomas, *of Buthlaw*	1818
670	Gordon, Lieutenant-Colonel Thomas, *of Park*	1825
	Gordon, Lieut. Col. W. A., late 50th Regiment	1818
	Gordon, Capt. Wm. H. E. I. C. Service, *residing at Newton*	1828
	Govan, John, W. S.	1809
	Græme, Robert, *of Garvock*	1824
	Graham, Major David, *of Meiklewood*	1831
	Graham, Frederick, Factor to the Duke of Athole	1821
	Graham, George, *late of Cassafuar*	1817
	Graham, George, *of Shaw*	1826
	Graham, Humphrey, W. S.	1819
680	Graham, James, *of Leitchtown*	1827
	Graham, James Gillespie, *of Orchill*, Architect, Edinburgh	1806
	Graham, John, *younger of Ballagan*	1823
	Graham, John, *at Newbigging*	1829
	Graham, Robert, *of Redgorton*, Advocate	1817
	Graham, Robert, M. D., Professor of Botany in the University of Edinburgh	1821
	Graham, Robert, Merchant, *Leith*	1826
	Graham, William, *of Mossknow*	1801
	Graham, William, Writer, *Glasgow*	1828
	Graham, William C. Cuningham, *of Gartmore*	1796
690	Grant, Alexander, one of the Representatives in the Honourable House of Assembly, Jamaica	1810
	Grant, Colonel Alexander *of Findrassie*	1826
	Grant, Captain Charles, *Elgin*	1816
	Grant, David Macdowal, *of Arndilly*	1792
	Grant, Duncan, *younger of Bught*, W. S.	1825

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		Admitted
	Grant, George Macpherson, *of Ballindalloch and Invereshie*	1806
§	Grant, James, *of Corymony*, Advocate	1784
	Grant, James, W. S.	1793
	Grant, James M. of *Glenmoriston and May*	1810
	Grant, James, *of Bught*	1813
700	Grant, James, Principal Tacksman of Ruthven	1827
	Grant, Rev. James, First Minister of South Leith	1828
	Grant, Captain John, *of Firhall, Nairnshire*	1820
	Grant, John Peter, W. S.	1823
	Grant, John, *of Kilgraston*	1819
	Grant, John Macpherson, *younger of Ballindalloch and Invereshie*	1827
	Grant, Major-General Lewis, Governor of Trinidad	1826
	Grant, Patrick, *of Lakefield*	1818
	Grant, Robert, *of Kincorth*	1826
	Grant, Robert, *of Tilliefour*	1830
710	Grant, William, *of Seabank*	1807
	Grant, W. P., *younger of Rothiemurchus*	1821
	Grassick, Charles, *residing at Buchaam*	1830
	Grassick, John, *Mains of Glenbucket*	1829
	Gray, John, Merchant, *Greenock*	1831
	Gray, Roderick, Factor for the Merchant Maiden Hospital, *Peterhead*	1829
	Greenhill, Alexander *of Fearn*, Advocate	1825
	Greenlaw, George, *Hilton*	1796
	Greenshields, John, *of Kerse*	1829
	Gregorson, John, *of Ardtornish*	1805
720	Greig, James, *of Eccles*, W. S.	1809
	Greig, James, *at Tullich*	1821
	Grierson, William, *of Garroch*, W. S.	1828
	Gunn, George, Factor on the Estate of Sutherland	1821
	Guthrie, Major, *Cottage*, Dundee	1826

H

*	HAMILTON & BRANDON, His Grace Alexander, Duke of	1804
	HASTINGS, The Most Noble the Marquis of	1830
	HASTINGS, The Right Hon. Flora, Marchioness of	1805
†	HADDINGTON, The Right Hon. Thomas, Earl of	1804
	HOPETOUN, The Right Hon. John, Earl of	1826
730	HAY, The Right Hon. Lord John, M. P.	1824
	HERRIES, The Right Hon J. C., M. P.	1829
	HOPE, The Right Honourable Charles, Lord President of the Court of Session	1793

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		Admitted
	HALLYBURTON, The Hon. Douglas Gordon, *of Pitcur*	1803
	HOPE, Sir John, *of Craighall*, Bart.	1808
	HAY, Sir John, *of Smithfield and Hayston*, Bart.	1811
	HALL, Sir James, *of Dunglass*, Bart.	1796
	HAMILTON, Sir Hew Dalrymple, *of Bargeny and North Berwick*, Bart. M. P.	1797
	HAY, Sir James Dalrymple, *of Park Place*, Bart.	1816
	HONYMAN, Sir Richard B. Johnston, *of Armadale*, Bart.	1817
740	HEPBURN, Sir John Buchan, *of Letham*, Bart.	1813
	HOPE, Lieut. Gen. Sir John, Col. of the 72d Highlanders, K. C. B.	1824
	HALLIDAY, Sir Andrew, M. D.	1806
	Hagart, Thomas, *of Bantaskine*	1826
	Hagart, William, late Merchant, *Leith*	1804
	Haig, William, *younger of Dollarfield*	1825
	Hall, John, *of Dunglass*	1829
	Hamilton, Alexander, *of Grange*, Advocate	1787
	Hamilton, Archibald, *younger of Dalzell*	1822
	Hamilton, The Reverend G. T., Minister of Ashkirk	1810
750	Hamilton, Dr James, *of Corwar*, Professor of Midwifery, University of Edinburgh	1817
	Hamilton, James, *of Kames*, W. S.	1807
	Hamilton, James, *of Barns*	1828
	Hamilton, John, *of Sundrum*	1804
	Hamilton, John Ferrier, *of Westport*	1827
	Hamilton, John, *of Fairholm*	1827
	Hamilton, Lieut. Col. R. Campbell, *of Milburn and Dalserf*	1804
	Hamilton, Robert William, Merchant, *Leith*	1814
	Hamilton, Robert, Advocate, Principal Clerk of Session	1802
	Hamilton, Thomas, Architect, *Edinburgh*	1826
760	Hamilton, William, Merchant, *Glasgow*	1823
	Hamilton, William, *of Craighlaw*	1829
	Hare, James, *Calderhall*	1806
	Hare, James, *of Handaxwood*	1831
	Hart, Major Thomas, *of Castlemilk*	1805
	Harvey, Alexander, *of Broadland*	1811
	Harvey, Lieutenant-Colonel James Lee, *of Castlesemple*	1823
	Harvey, John, W. S.	1811
	Harvey, John, *of Ickwell, Bury, and Tiningly Park, Yorkshire*	1809
	Hathorn, Hugh, *of Castlewig*	1825
770	Hathorn, Vans, *of Garthland*, W. S.	1802

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Hawes, Benjamin, *of Old Barge Stairs, Blackfriars, London* 1808
Hawkins, John Whitshed, *of Dunnichen*, Advocate 1819
Hay, Adam, Banker, *Edinburgh* 1825
Hay, General Alexander, *of Rannes* 1812
Hay, Major A. Leith, *younger of Rannes* 1819
Hay, Charles, *of Ballindosh* 1825
Hay, James, *of Belton* 1820
Hay, James, Merchant, *Leith* 1828
Hay, Robert, *of Spott* 1807
780 Hay, William, *of Laxfrith* 1828
Hay, William, *of Drummelzier* 1819
Hector, Alexander, Writer, *Edinburgh* 1824
Henderson, Captain David, *younger of Stemster* 1829
Henderson, Duncan, M. D. 78th Highlanders 1825
Henderson, John Alexander, *of Westerton*, 4th, or Queen's Own Light Dragoons 1831
Henderson, John Irving, Advocate 1823
Henderson, William, Merchant, *Edinburgh* 1811
Henderson, William, late Secretary British Linen Company 1823
Henry, John, *of Corse* 1815
790 Hepburn, John, *of Colquhalzie* 1810
Hepburne, Robert, *of Clerkington* 1806
Herries, William Young, *of Spotts* 1823
Heriot, John, *Ladykirk* 1828
Heriot, James, *of Ramornie*, W. S. 1800
Hill, George Gosset, Merchant, *London* 1823
Hill, Henry David, W. S. 1825
Hill, Norman, *of Brownhills*, Advocate 1807
Hill, Robert, *of Firth*, W. S. 1800
Hood, John, *of Stoneridge* 1827
800 Home, Francis, *younger of Cowdenknows* 1829
Home, Colonel James, *of Broomhouse* 1829
Home, Dr James, *of Cowdenknows*, Professor of Physic in the University of Edinburgh 1799
Home, John Forman, *of Wedderburn* 1830
Home, William Forman, *of Billie and Paxton* 1823
Hope, James, W. S. 1804
Hope, John, Dean of the Faculty of Advocates 1823
Hope, Dr Thomas Charles, Professor of Chemistry in the University of Edinburgh 1804
Horne, Archibald, Accountant, *Edinburgh* 1828
Horne, Donald, W. S. 1817

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		Admitted
810 §	Horne, James, *of Langwell*	1784
	Horne, William, *of Stircock*, Advocate, Sheriff of Haddingtonshire	1813
	Horrocks, John, *of Tullicherran Castle*	1818
	Horsburgh, John, Factor to the Marquis of Stafford, for the Estate of Resy	1829
	Horsburgh, Major William Henry	1824
	Hoseason, Robert, *of Mossbank, Shetland*	1826
	Hosier, James, *younger of Newlands*, Advocate	1822
	Houston, Ludovick, *of Johnston Castle*	1823
	Houston, Thomas, *of Orcech*	1821
	Howard, Lieutenant Colonel, *late North British Staff*	1809
820	Howden, James, Jeweller, *Edinburgh*	1827
	Hunt, James, *of Pittenrieff and Logie*	1816
	Hunter, Alexander, W.S.	1824
	Hunter, Andrew, *of Hollybush*	1819
	Hunter, Charles, *residing at Templehall*	1826
	Hunter, Charles, *younger of Seaside*	1823
	Hunter, David, *of Blackness*	1826
	Hunter, Duncan, *London*	1802
	Hunter, George, *of Callander*	1820
	Hunter, James, *of Thurston*	1812
830	Hunter, James, *of Templehall*	1823
	Hunter, Capt. James, of His Majesty's 70th Regt.	1823
	Hunter, James, *of Seaside*	1826
	Hunter, James, *of Hafton*	1825
	Hunter, William, *of Ormistoun*	1812
	Hutchison, Hugh, *of Southfield*	1812
	Hutchison, Robert, *younger of Cairngall*	1829
	Hutchison, Thomas, *Mains of Tinwald*	1830

I

	Innes, Sir Hugh, *of Lochalsh*, Bart.	1802
	Irvine, Sir Paulus Emilius, Bart.	1831
840	Inglis, James P. late Merchant, *Leith*	1806
	Inglis, John, *of Redhall*	1825
	Innes, Gilbert, *of Stow*, Treasurer of the Society	1799
	Innes, James Rose, *of Netherdale*, Advocate	1827
	Innes, Robert, *younger of Thrumster*	1824
	Irvine, Patrick, *of Inveramsay*, writer to the Signet	1827
	Irving, George, Merchant, *London*	1813
	Izett, Chalmers, *late of Kinnaird*	1808

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Admitted

J

JARDINE, Sir William, *of Applegirth*, Bart. 1823
JARDINE, Sir Henry, *of Harwood*, King's Remembrancer of Exchequer 1799
850 Jameson, James, *of Drums* 1829
Jameson, Robert, Professor of Mineralogy and Natural History in the University of Edinburgh 1820
Jameson, Robert, Advocate 1815
Jameson, Robert, W. S. 1803
Jardine, James, Civil Engineer, *Edinburgh* 1818
Jardine, Thomas, *Moffat* 1829
Jerdan, Archibald, *of Renieward* 1831
Johnston, George, Factor to the Earl of Eglinton 1822
Johnston, John, Writer, *Edinburgh* 1823
Johnston, Alexander, W. S. 1819
860 Johnston, George jun., *St Cuthbert Street, Edinburgh* 1828
Johnston, Henry, Surgeon, *Edinburgh* 1798
Johnston, James, *of Straiton*, M. P. 1823
Johnston, James, *of Alva* 1828
Johnstone, John James Hope, *of Annandale*, M. P. *for Dumfriesshire* 1824
Johnston, John, Landsurveyor 1806
Johnston, Peter, *of Cairnsallach* 1803
Johnston, Robert, Merchant, *Edinburgh* 1813
Johnstone, Captain Charles, *of Cowhill*, R. N. 1830
Johnston, Thomas, *of Underwood*, S. S. C. 1812
870 Johnstone, Walter, *of Chapplegill* 1829
Johnstone, William, Merchant, *Greenock* 1825
Jollie, Walter, W. S. 1829
Jolly, David Leitch, *Grange of Elcho* 1829
Jolly, Stewart, Chamberlain to His Grace the Duke of Montrose 1827
Jopling, Thomas, *Coldstream* 1823

K

KINNOUL, The Right Honourable Thomas, Earl of 1806
KINTORE, The Right Honourable Anthony, Earl of 1826
KENMURE, The Right Honourable John, Viscount 1828
KELBURNE, The Right Honourable James, Viscount 1822
880 KINNAIRD, The Right Honourable Lord 1830
KERR, The Right Honourable Lord Robert 1808
KINLOCH, Sir David, *of Gilmerton*, Bart. 1828

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		Admitted
	KEIR, Major-General Sir William Grant	1804
	KEITH, Sir Alexander, *of Ravelstone*, Knight Marischall	1809
	Keay, James, *of Snaigo*, Advocate	1806
	Keir, Patrick Small, *of Kinmonth*, Advocate	1805
890	Keith, William, Accountant *in Edinburgh*	1821
	Kennedy, John, *of Milton Park, Ardwick House, Manchester*,	1830
	Kennedy, T. F. *of Dunure*, M. P.	1812
	Ker, James, *of Blackshiels*	1825
	Kerr, John, *of Kerfield*, W. S.	1805
	Kerr, Robert, Surgeon, *Portobello*	1816
	Kerr, William, Merchant, *Leith*	1801
	Kerr, William, retired Secretary-General of Post-Office	1789
	Kidd, Alexander, Writer, *Edinburgh*	1824
	Kilgour, Robert jun. *of Millbank*	1826
900	Kincaid, John Lennox, *younger of Kincaid*	1824
	Kinloch, George, *younger of Kinloch*, Advocate	1825
	Kinloch, John, *of Kilrie*, Lieutenant 2d Life Guards	1829
	Kinnear, Charles, *of Kinnear*	1824
	Kinnear, George, Banker, *Edinburgh*	1803
	Kinnear, Patrick, *younger of Lochton*	1823

L

†	LOTHIAN, The Right Hon. John William, Marquis of	1821
	LAUDERDALE, The Right Honourable James, Earl of K. T.	1789
†	LEVEN and MELVILLE, Right Honourable David, Earl of	1820
	LYNDOCH, Right Hon. Lieut. Gen. Thomas, Lord, G. C. B.	1803
910	LIVINGSTONE, Sir Thomas, *of West Quarter*, Bart.	1815
	LAWRIE, Sir Robert, *of Maxwelltown*, Bart.	1828
	LAUDER, Sir Thomas Dick, *of Fountainhall*, Bart.	1827
	LOCKHART, Sir C. Macdonald, *of Lee and Carnwath*, Bart.	1817
	LISTON, Right Hon. Sir Robert, *of Listonshiels*, G. C. B.	1806
	LEITH, Colonel Sir Alexander, *of Freefield*	1811
	L'Amy, James, *of Dunkenny*, Sheriff of Forfarshire	1806
	Laidlaw, James, W. S.	1794
	Laing, Rev. Francis, Rector of Langmais, *Glamorganshire*	1824
	Lamond, James, *of Stranduff*	1827
920	Lamond, Peter, Brewer, *Edinburgh*	1820
	Lamont, Alexander, *of Knockdow*, W. S.	1819
	Lamont, James, *Howard Place, Edinburgh*	1824
	Lang, Alexander, *of Overton*	1801
	Laurie, Thomas, Land Valuator, *Edinburgh*	1829

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		Admitted
	Laurie, William Kennedy, *of Woodhall*	1827
	Lawrenson, Lieut. Col. John, *of Inveraighty*	1800
	Lawson, Charles, *Nursery and Seedsman, Edinburgh*	1830
	Lawson, Robert, *of Ballinore*	1813
	Learmonth, John, Merchant, *Edinburgh*	1814
	Learmonth, Thomas *of Lawrence Park*	1824
	Legh, Rev. Peter, *Golborne Park, Lancashire*	1823
930	Legh, Thomas, M. P. *Lyme, Cheshire*	1823
	Leitch, James, Merchant, *Greenock*	1831
	Leitch, Quintin, *Greenock*	1819
	Lennox, James *of Dalskairth*	1830
	Leslie, Angus, *Prinsinain*	1830
	Leslie, George, *of Rathie*	1826
	Leslie, H. G. *of Denlugas*	1826
	Leslie, William, *of Warthill*	1826
	Leny, James Macalpine, *of Dalswinton*	1824
	Limond, Colonel James, late Madras Artillery	1828
940	Lindsay, Lieut.-Col. James, *younger of Balcarras*, M. P.	1823
	Lindsay, John, Corn Merchant, *Dundee*	1826
	Lindsay, Patrick, Wine-merchant, *Leith*	1823
	Lindsay, Lieutenant-Colonel Martin, 78th Regiment	1816
	Linning, Michael, *of Colzium*, W. S.	1804
	Loch, James, M. P.	1822
	Loch, William, *of Rachan*	1824
	Lockhart, Colonel Elliot, *of Borthwickbrae and Cleghorn*	1806
	Lockhart, Norman, *of Tarbrax*	1815
	Logan, Alexander, *London*	1831
950	Lorimer, James, *of Kellyfield*, Factor to the Right Honourable the Earl of Kinnoul	1826
	Lorraine, Lieut.-Col. A., Dep. Gov. South Sea Castle	1827
	Lothian, Edward, Advocate	1805
	Louson, David, Town-Clerk of Arbroath	1813
	Low, Alexander, *Accountant, Edinburgh*	1830
	Low, David, *of Laws*	1825
	Lumsden, Benjamin, *of Kingsford*	1828
	Lumsden, Harry Leith, *of Auchindoir*	1822
	Lumsden, Henry, *of Tilwhilly*	1830
	Lumsden, Hugh, *of Pitcaple*, Advocate, Sheriff of Sutherlandshire	1825
960	Lundie, Archibald, W. S.	1796
	Lyall, Robert, Factor to Sir J. Carnegie, *of Southesk*, Bart.	1826
	Lyon, George, *of Glenogle*	1809
	Lyon, John, High School, *Leith*	1824

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Admitted

M

*	MONTROSE, His Grace James, Duke of, K. G.	1785
†	MORTON, The Right Honourable George Sholto, Earl of	1828
†	MORAY, The Right Honourable Francis, Earl of, K. T.	1793
†	MANSFIELD, The Right Honourable William, Earl of	1803
	MINTO, The Right Honourable Gilbert, Earl of	1808
†	MELVILLE, The Right Honourable Robert, Viscount, K. T.	1798
970	MONTAGUE, The Right Honourable Henry James, Lord	1801
	MACDONALD, the Right Hon. Godfrey Bosville, Lord	1796
	MURRAY, Lieutenant-General the Right Honourable Sir George, G. C. B., M. P. *for Perthshire*	1826
	MAULE, The Hon. William Ramsay, *of Panmure*, M. P. *for Forfarshire*	1805
	MACDONALD, Honourable Archibald	1796
	MACDONALD, Honourable Dudley	1803
	MACKENZIE, The Honourable Mrs Stewart, *of Seaforth*	1816
	MEADOWBANK, The Honourable Lord	1800
	MACKENZIE, The Honourable Lord	1803
	MEDWYN, The Honourable Lord	1802
980	MONCREIFF, The Honourable Lord	1830
	MAITLAND, Lieutenant-General the Hon. W. Mordaunt	1827
	MACINTOSH, the Honourable Angus, of Macintosh, Captain *of Clanchattan*	1829
	MAXWELL, General Sir William, *of Calderwood*, Bart.	1804
	MENZIES, Sir Neil, *of Menzies*, Bart.	1802
	MURRAY, the Honourable Sir Patrick *of Ochtertyre*, Bart. Baron of Exchequer	1793
	MACKENZIE, Sir George S. *of Coul*, Bart.	1801
	MAXWELL, Major-Gen. Sir Wm., *of Monreith*, Bart.	1803
	MAXWELL, Sir John, *of Pollok*, Bart.	
	MAXWELL, Sir Patrick, *of Springkell*, Bart.	1830
990	MACKENZIE, Sir Francis Alexander, *of Gairloch*, Bart.	1824
	MACKENZIE, Sir James Wemyss, *of Scatwell*, Bart. M. P. *for Ross-shire*	1817
	MONTGOMERY, Sir George, *of Macbiehill*, Bart.	1805
	MACGREGOR, Sir Evan Murray, *of Macgregor*, Bart.	1801
	MONTGOMERY, Sir James, of Stanhope, Bart. M. P. *for Peeblesshire*	1801
	MAXWELL, Sir David, *of Cardoness*, Bart.	1810
§	MACKENZIE, Sir Alexander Muir, *of Delvine*, Bart.	1784
	MACDONALD, Sir James, Bart. M. P.	1805
	MARJORIBANKS, Sir John, *of Lees*, Bart.	1814

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		Admitted
	MILNE, Admiral Sir David, K. C. B.	1808
1000	Macadam, John, *of Blairover*	1824
	Macalister, Alexander, *of Straitheird*	1789
	Macalister, Angus, *of Balnakiel*	1821
	Macalister, Charles S., *of Kennox*	1806
	Macalister, Captain James, *of Springbank*, 13th Dragoons	1807
	Macalister, Keith Macdonald, *Ardincaple*	1829
	Macalister, Coll. Matt. *of Rosshill*	1797
	Macallan, James, W. S.	1823
	Macarthur, Dr Peter, *of Delnies*	1819
	Macartney, Alexander, Manager Commercial Banking Co.	1823
1010	Macbean, Æneas, W. S.	1812
	Macbean, Duncan, *of Tomatin*, Merchant, *Glasgow*	1828
	Macbean, Lieutenant Colonel James, late 78th Regiment	1806
	Macbraire, James, *of Fiskwick and Tweedhill*	1819
	Maccaskill, Captain Kenneth, *of Rudunan*	1821
	Macaskill, Hugh, *of Talliskar*	1830
	Maccheyne, Adam, W. S.	1819
	Maccormick, Samuel, Advocate, Sheriff of Buteshire	1819
	Maccorquodale, Hugh, Merchant, *Liverpool*	1803
	Maccrummen, Donald, Merchant, *Leith*	1821
1020	Maccrummen, Captain John, 11th Regiment of Foot	1821
	Macculloch, John, *of Barholm*	1810
	Macdiarmid, John, *Dumfries*	1827
	Macdonald, Alexander, *of Rhue*	1824
	Macdonald, Captain Alexander, Royal Home Artillery	1810
	Macdonald, Colonel Alexander, late 74th Regiment	1793
	Macdonald, Lieutenant-Colonel Alexander, 76th Regiment	1811
	Macdonald, Captain Angus, *of Milltown*	1798
	Macdonald, Angus, *of Glenalladale*	1827
	Macdonald, Anthony, *of Lockgarry*	1819
1030	Macdonald, Coll, *of Dalness*, W. S.	1790
	Macdonald, Lieut. Col. D. Robertson, *of Kinlochmoidart*	1805
	Macdonald, Major Donald, *of Ardmore*	1822
	Macdonald, Captain Donald, Royal Engineers	1817
	Macdonald, Donald, *of Craigruie*	1829
	Macdonald, Captain Gilbert, late of the Scots Royals	1816
	Macdonald, Hugh, *of Boisdale*	1820
	Macdonald, Hugh P. *of Mougstad*	1830
	Macdonald, Captain James, *at Culnakyle*	1819
	Macdonald, James, *younger of Dalness*, Advocate	1822
1040	Macdonald, Rev. James, *of Kinnairdy*	1826
	Macdonald, James, Merchant, *Edinburgh*	1828

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		Admitted
	Macdonald, John, *of Sanda*	1811
	Macdonald, Captain John, *of Springfield*	1797
	Macdonald, Lieutenant-Colonel John, *of Kingsburgh*	1797
	Macdonald, Lieut. Col. John, *of Dalchosnie*, 92d Regiment	1819
	Macdonald, Matthew N., W. S.	1818
	Macdonald, Norman, *of Barnisdale*	1789
	Macdonald, Major R. late 92d Reg. Military Sec. *Jamaica*	1823
	Macdonald, Ranald, *of Bornish*	1806
1050	Macdonald, Reginald George, *of Clanranald*	1807
	Macdonald, Reginald, *of Staffa*, Sheriff of Stirlingshire, Principal Secretary of the Society	1796
	Macdonald, Lieut.-Colonel Robert, Royal Horse Artillery	1814
	Macdonald, Thomas, *Fort William*	1827
	Macdonald, William, *of St Martins*	1802
	Macdonald, Major William, *of Calley*	1813
	Macdonald, William, *of Ballyshare*	1818
	Macdonell, Major-General James, Coldstream Guards	1803
	Macdonell, James, *of Milnfield*, W. S.	1812
	Macdonell, Captain John, *Killyhonet, Fort William*	1821
1060	Macdoual, Colonel Andrew, *of Logan*	1801
	Macdouall, Lieutenant-Colonel, *of Stranraer*	1824
	Macdougall, Allan, W. S.	1829
	Macdougal, Archibald, *of Belfast, Ireland*	1827
	Macdougal, Colin, *of Lunga*	1808
	Macdougal, Dugald, *of Gallanich*	1814
	Macdougal, George, *Edinburgh*	1813
	Macdougall, John, *of Macdougall*, Captain R. N.	1821
	Macdougal, Major Patrick, *of Soroba*	1800
	Macdowal, William, *of Woolmet*	1810
1070	Macduff, Alexander, *of Bonhard*	1811
	Maceachern, Captain Colin, *of Oatfield*	1825
	Macfarlane, Alexander, *of Thornhill*	1825
	Macfarlane, Duncan, Advocate	1806
	Macfarlane, John, *of Muckroy*	1821
	Macfarlane, John Fletcher, Surgeon, *Edinburgh*	1823
	Macfarlane, Thomas, *Strachurmore*	1829
§	Macfarlane, William, W. S.	1784
	Macfarlane, William Dick, *of Dundvourd*, 42d or Royal Highlanders	1831
	Macfie, John, Merchant, *Leith*	1823
1080	Macfie, William, *younger of Langhouse*, Merchant, *Greenock*	1826
	Macgillivray, Simon, Merchant, *London*	1821
	Macgillivray, William, *Jamaica*	1817

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		Admitted
	Mackgill, David Maitland, *of Rankeilour*	1826
	Macgoune, Robert, *of Mains*	1824
	Macgregor, Alexander jun. *Glasgow*	1823
	Macgregor, Captain Charles, *at Delavorar*	1818
	Macgregor, Major Hugh, late 91st Regiment	1814
	Macgregor, James, *of Fonab*	1822
	Macgregor, Major-General Murray, Bengal Cavalry	1801
1190	Macinnes, James, S. S. C.	1812
	Macinnes, John, *at Dandaleith*	1822
	Macinnes, John, *of Achinfroe and Woodburn*	1830
	Macinroy, James Patrick, *of Lude*	1831
	Macinroy, William, *of Shierglas*	1827
	Macintosh, Lieut.-Colonel J. J. *of Far*, Madras Artillery	1823
	Macintosh William, *of Geddes and Hilton*	1816
	Macintosh, William, *of Millbank*	1813
	Macintosh, Donald, W. S.	1816
	Macintosh, Donald, *Edinburgh*	1816
1100	Macintosh, Lachlan, *of Raigmore*	1814
	Macintosh, Simon F., W. S.	1821
	Macintyre, Donald, *late of Pitnacree*	1803
	Macintyre, Donald, Writer, *Glasgow*	1818
	Macivor, John, *of Ardmarnock*	1827
	Mackay, Major Colin Campbell, *of Bighouse*	1808
	Mackay, James, Goldsmith, *Edinburgh*, the Society's Jeweller and Medalist	1804
	Mackay, Kenneth, *of Torboll*	1805
	Mackean, John, Manager of the Scot. Life Assur. Comp.	1822
	Mackellar, Reverend Angus, Minister of Pentcaitland	1818
1110	Mackellar, Duncan, Merchant, *Glasgow*	1809
	Mackenzie, Alexander, *of Woodside, Inverness*	1802
	Mackenzie, Alexander, Sheriff-Substitute of Ross-shire	1805
	Mackenzie, Alexander, *of Hilton*	1807
	Mackenzie, Alexander, Writer, *Perth*	1829
	Mackenzie, Colin, *of Kilcoy*	1801
	Mackenzie, Major Forbes, *of Fodderty*	1829
	Mackenzie, George Falconer, *of Allangrange*	1819
	Mackenzie, George Ross, *of Aldie*	1819
	Mackenzie, George, *Dingwall*	1830
1120	Mackenzie, James William, *of Pittrichie*	1825
	Mackenzie, John W. Pitt Muir, *younger of Delvin*, Advocate,	1829
	Mackenzie, John, Agent at Inverness for the Bank of Scotl.	1809
	Mackenzie, John, Writer, *Edinburgh*	1813
	Mackenzie, John Hay, *of Cromertie*	1822

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Mackenzie, John Whiteford, W.S. 1821
Mackenzie, J. A. Stewart *of Seaforth* 1803
Mackenzie, Kenneth Francis, *late of Park Place, Edinburgh* 1811
Mackenzie, Murdo, *of Ardross* 1799
Mackenzie, Richard, *of Dolphington*, W.S. Deputy Keeper of the Signet 1809
1130 Mackenzie, Sutherland, Manager of the Scottish Union Insurance Company 1808
Mackenzie, Thomas, *of Applecross* 1816
Mackenzie, William, *of Pitlundy* 1801
Mackenzie, William, *of Muirton*, W.S. 1803
Mackenzie, William, *late of Calcutta* 1818
Mackinlay, John, *of Rothesay* 1818
Mackinnon, Alexander Kenneth, *of Skalisaig* 1827
Mackinnon, Dr Farquhar, *of Kyle* 1819
Mackinnon, Reverend John, Minister of Slate 1815
Mackinnon, Neil, *of Demerara* 1819
1140 Mackinnon, William Alexander, *of Mackinnon* 1811
Mackintosh, Charles, *of Aberarder* 1831
Maclachlan, Robert, *of Maclachlan* 1817
Maclaggan, Dr Henry, F. R. C. P. E. 1813
Maclaine, Murdoch, *of Lochbuy* 1811
Maclarty, Colin, *late of Jamaica* 1808
Maclaurin, Malcolm, *Oban* 1803
Maclean, Colonel Alexander, *of Ardgower* 1793
Maclean, Alexander, *of Coll* 1785
Maclean, Archibald, *younger of Ardgower*, Captain R. N. 1827
1150 Maclean, Donald, *of Borera* 1822
Maclean, Donald, W.S. 1793
Maclean, Hugh, *younger of Coll* 1809
Maclean, Hugh, *late of Jamaica* 1827
Maclean, John, *of Killunden* 1822
Maclean, Dr Lachlan, Principal Tacksman of Rum 1823
Macleish, Adam, Merchant, *Greenock* 1831
Macleod, Alex. Chamberlain to Lord Macdonald, Skye 1829
Macleod, Alexander, *of Canada* 1811
Macleod, Alexander Norman, *of Harris* 1817
1160 Macleod, Alexander, *of Muirwoodside* 1800
Macleod, Charles Murray, Advocate 1821
§ Macleod, Donald, *of Geanies*, Sheriff of Ross-shire 1784
Macleod, Donald, *of Talisker* 1800
Macleod, Donald, *at Claggan* 1830
Macleod, Eneas, R. B. *of Cadboll* 1786

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		Admitted
	Macleod, Captain Neil, *Gesto*	1799
	Macleod, Major-General John, *of Unish*	1804
	Macleod, John Norman, *of Macleod*	1806
	Macleod, Mrs, *of Macleod*	1816
1170	Macleod, Roderick, *younger of Cadboll*	1807
	Macleod, Colonel William, Hon. East India Company's Service	1817
	Maclellan, John, Merchant, *Greenock*	1831
	Macmillan, Donald, *of Lephenstrath*	1825
	Macmillan, Captain Iver, of the Valentine Indiaman	1798
	Macmillan, Michael, Merchant, *Glasgow*	1810
	Macmillan, Robert, *of Rollae*, W. S.	1809
	Macmillan, Thomas, *younger of Shorthope*, W. S.	1817
	Macnab, Archibald, *of Macnab*	1806
	Macnab, Colin, *of Suie*	1809
1180	Macnair, James, *of Glasgow*	1815
	Macneale, George, *of Ugadale*	1825
	Macneil, Lieutenant-Colonel Donald, late 91st Regiment	1802
	Macneil, Hector Frederick, *of Gallochilly*	1812
	Macneil, John, *of Oakfield*	1796
	Macneil, Colonel Roderick, *of Barra*	1817
	Macneil, Alexander, Collector of Customs, *Stranraer*	1829
	Macnicol, John, Accountant, *Dundee*	1831
	Macpherson, Allen, 2. *Harley Place, New Road, London*	1822
	Macpherson, Allen, *Kingussie*	1821
1190	Macpherson, Colonel Duncan, Hon. E. I. C. S.	1825
	Macpherson, Ewen, *of Cluny Macpherson*	1827
	Macpherson, Hugh, *of Eigg*, M. D. one of the Professors of King's College, Aberdeen,	1828
	Macpherson, John, Factor for Lovat	1809
	Macpherson Kenneth, late Member of the Hon. House of Assembly, Jamaica	1826
	Macpherson, William, *of Blairgowrie*	1822
	Macquarrie, Lieutenant-Colonel Charles, *of Glenforsa*	1796
	Macqueen, Captain, *lately residing at Carrybrough*	1820
	Macqueen, Hugh, W. S.	1816
	Macrae, Colin, *of Demerara*	1823
1200	Macritchie, Charles Elder, *Edinburgh*	1831
	Macritchie, Thomas, Merchant, *Leith*	1805
	Macritchie Thomas Elder, *of Crosgton*, W. S.	1831
	Macturk, Robert, *younger of Stenhouse*	1826
	Macvicar, Major Charles, late of the 42d Regiment	1796
	Macvicar, John, *of Kierfield*	1823

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Macvicar, Rev. J. G. Lecturer on Natural History in the University of St Andrew's 1828
Maidment, James, Advocate 1824
Mair, Colonel Alexander, Lieut. Gov. of Fort George 1824
Maitland, Adam, *of Dundrennan* 1802
1210 Maitland, William, *of Auchlane, Gelston Castle* 1825
Malcolm, Neill, *Poltaloch* 1804
Malcolm, Neill, *younger of Poltaloch*, M. P. 1830
Mansfield, John, *of Midmar* 1827
Mansfield, Thomas, Accountant, *Edinburgh* 1827
Marshall, Claud, Sheriff substitute of Greenock 1819
Marshall, David, *of Neilsland* 1828
Marshall, John, Advocate 1822
Massie, W. W. Hon. East India Comp. Civil Service 1816
Masterton, James, *of Braco* 1824
1220 Mathie, David, *Glasgow* 1809
Maule, William, *Great King Street, Edinburgh* 1830
Maxtone, Anthony, *of Cultoquhey* 1812
Maxwell, Henry, 2d son of Sir William Maxwell, *of Calderwood*, Bart. 1830
Maxwell, James, *Mull* 1803
Maxwell, John, *younger of Pollock* 1825
Maxwell, John Henries, *of Munches* 1826
Maxwell, Lieut. Col., *of Orchardtown and Gretna* 1825
Maxwell, Marmaduke Constable, *of Terreglas* 1830
Maxwell, W. A., *younger of Calderwood*, Major, 1st or King's Dragoon Guards 1830
1230 Maxwell, William Constable, *of Nithsdale and Everingham* 1830
May, John, *of Bradfield*, Merchant, *Glasgow* 1827
Mayne, Colonel John, Hon. East India Comp. Service 1831
Meek, George, *of Campfield* 1814
Megget, Thomas, W. S. 1811
Meikleham, James, *of Cairnbroe* 1831
Melville, John Whyte, *of Mount-Melville* 1819
Menteith, Charles Granville Stewart, *of Glenbarr* 1803
Menzies, Major Archibald, late of the 42d Regiment 1817
Menzies, Joseph Stewart, *of Fass* 1803
1240 Menzies, John, Cashier to the Duke of Gordon 1804
Menzies, John, *of Pitfodels* 1806
Menzies, John, *of Chesthill* 1821
Menzies, Robert, W. S. Depute Clerk of Session 1798
Menzies, Robert, Land-surveyor, *Aberfeldy* 1829
Mercer, George, *of Gorthy* 1822

		Admitted
	Mercer, Græme, *of Mavisbank*	1819
	Mill, George, *of Blair*	1826
	Mill, John, Merchant, *Edinburgh*	1814
	Milne, David, *Aberdeen*	1826
1250	Millar, Andrew, Merchant, *Edinburgh*	1827
	Miller, Alexander, *of Dalnair and Ernock*	1825
	Miller, George, *of Frankfield*	1814
	Miller, Thomas Hamilton, *Advocate*	1804
	Miller, Patrick, *Dalswinton*	1806
	Miller, William, *of Monkcastle*, Advocate	1828
	Mitchell, Colonel James, late of the 92 Regiment	1821
	Mitchell, Patrick, *residing at Enzean, Monymusk*	1831
	Mitchell, William, *of Gordonhall*	1821
	Mitchell, William, *of Parsons Green*	1819
1260	Molle, William, *of Mains*, W. S.	1802
	Moodie, Major James, *of Melsetter*	1801
	Moore, Colonel Archibald, Vice-Lieutenant of Buteshire	1810
	Moore, James Carrick, *of Corsewell*	1829
	More, John Shank, Advocate	1816
	Moir, Charles Alexander, *of Leckie*	1814
	Moir, John, Printer, *Edinburgh*	1804
	Moir, Walter, Sheriff-substitute, *Glasgow*	1803
	Moncrieff, Robert Scott, *younger of Kirkton*, Advocate	1831
	Moncrieff, Robert Hope, *Perth*	1825
1270	Monro, Dr Alex., Prof. of Anatomy in the Univ. of Edin.	1807
	Montgomery, Robert, Lord Treasurer's Remembrancer	1829
	Monteith, Henry, *of Carstairs*, M. P.	1808
	Monypenny, Alexander, W. S.	1827
	Moray, James, *of Abercairney*	1811
	Moreland, Charles, Banker, *Stranraer*	1827
	Morison, John, *of Auchintoul*, M. P.	1825
	Morison, John, W. S.	1818
	Morison, Theodore, *of Bognie*	1798
	Morton, Sam. Agricultural Implement-maker, *Leith Walk*	1822
1280	Morton, Robert, Jeweller, *Edinburgh*	1812
	Mowat, William, *Garth*	1807
	Mowbray, John, *of Cambus*	1825
	Mowbray, Rear-Admiral R. H. *of Cockairney*, C. B.	1827
	Moyes, Reverend Laurence, Minister of Forglen,	1820
	Muir, Andrew, Merchant, *Greenock*	1826
	Muir, James, Merchant, *Greenock*	1827
	Muirhead, Claud, Publisher of the Edinburgh Advertiser	1820
	Mundell, Alexander, Solicitor, *London*	1805

		Admitted
	Mundell, Robert, *of Wallacehall*	1831
1290	Munro, Hugh, *of Teaninich*	1799
	Munro, Alexander, *Prince's Street, Edinburgh*	1810
	Munro, Lieut. Col. Commandant William, Madras Army	1825
	Murdoch, John Burn, *of Gartinmader*	1820
	Mure, James O. Lockhart, *of Livingstone*	1828
	Mure, Colonel William, *of Caldwell*	1804
	Mure, William, Factor to the Earl of Selkirk,	1830
	Murray, Alexander, *of Broughton*	1822
	Murray, Andrew, *of Murrayshall*, Sheriff of Aberdeenshire	1804
	Murray, Anthony, *of Crieff*	1818
1300	Murray, Anthony, *younger of Dollerie*, W. S.	1828
	Murray, James, of the Monkland Iron Works	1828
	Murray, John Archibald, Advocate	1823
	Murray, John Dalrymple, *of Murraythwaite*	1825
	Murray, John, W. S.	1811
	Murray, Joseph, *of Ayton*	1820
	Murray, Patrick, *of Simprim*	1794
	Murray, Colonel Robert Macgregor	1799
	Murray, William, *of Polmaise*	1806
	Murray, William, Banker, *Tain*	1817
1310	Murray, William, *of Bankrock*	1827
	Murray, William, *of Henderland*	1826
	Murray, William, *younger of Ochtertyre*	1830
	Mutrie, David, Merchant, *Glasgow*	1804
	Mylne, Thomas, *of Mylnefield*	1826

N

	NORTHLAND, The Right Honourable Thomas, Viscount	
	NAPIER, The Right Honourable William John, Lord	1818
	NAPIER, Sir William Milliken, of Milliken, Bart.	1820
	NICHOLSON, Sir Arthur, *of Lochend*, Bart.	1812
	Nairne, David, *of Drumkilbo*	1826
1320	Nairne, James Mellis, *of Dunsinane*	1821
	Nairne, James, *of Claremont*, W. S.	1829
	Napier, John, *of Mollance*	1822
	Napier, Robert Dunmore, *of Ballekinrain*	1824
	Napier, William, *of Blackstone*	1815
	Neil, Major William, *of Barmeill*	1824
	Neill, Patrick, Secretary Caledonian Horticultural Society	1808
	Newton, Abraham, Merchant, *Leith*	1828
	Nicholson, Major Allan Macdonald, *of Ardmone*	1819

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		Admitted
	Nisbet, Archibald, *of Carphin*	1820
1330	Nisbet, George More, *of Cairnhill*	1817
	Niven, John, *of Thornton*	1805
	Niven, Robert William, W. S.	1823
	Niven, William, *of Achalton and Kirkbride*	1812

O

	OGILVIE, The Honourable William, *of Airlie*	1823
	OGILVIE, The Honourable Donald, *of Clova*	1824
	OGILVIE, Sir John, *of Inverquharity*, Bart.	1824
	OSWALD, Lieut. Gen. Sir John, *of Dunnikier*, G. C. B.	1824
	ORDE, Sir John Poullet, *of Kilmory*, Bart.	1830
	Ochterlony, John, *of Guynd*	1797
1340	Ogilvie, Captain William, R. N.	1820
	Ogilvie, William, *of Chesters*, Advocate	1809
	Oliphant, Charles, W. S.	1813
	Oliphant, Laurence, *of Condie*	1828
	Oliphant, James, *of Gask*	1828
	Oliver, Thomas, *Lochend*	1825
	Oliver, William, *of Dinlabyre*, Sheriff of Roxburghshire	1825
	Orr, Charles James Fox, *of Thornly Park*, W. S.	1816
	Orr, Patrick, W. S.	1825
	Osborne, Alexander, retired Commissioner of Customs	1805
1350	Oswald, James, *of Shieldhall*	1829
	Oswald, Richard Alexander, *of Auchencruive*	1803
	Oswald, Lieutenant-Colonel Robert, *at Dunnikier*	1824

P

	PITMILLY, David Monypenny, Lord, retired Senator of the College of Justice	1804
	PRINGLE, Sir John, *of Stitchell*, Bart.	1810
	Pagan, William, *of Linburn*	1800
	Parish, Woodbine, late Chairman of the Board of Excise	1819
	Parkes, Samuel, *of London*	1817
	Parkynes, Thomas Boultbie, *of Oakhouse, Gloucestershire*	1826
	Paterson, Alexander, *Thurso*	1801
1360	Paterson, George, *of Castle Huntly*	1804
	Paterson, John, factor to the Duke of Hamilton in Arran	1826
	Patison, John, W. S.	1806
	Patrick, Robert, *of Trearne and Hazlehead*	1801
	Patrick, William, *of Roughwood*, W. S.	1805

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Patton, James Murray, *of Glenalmond* 1830
Paul, Henry, *of Woodside*, Accountant, *Glasgow* 1830
Paul, William, Accountant, *Edinburgh* 1829
Pearson, Alexander, W. S. 1819
Peat, Thomas, W. S. 1820
1370 Peddie, James, W. S. 1819
Pedie, William, Writer, *Perth* 1828
Pennycuick, John, *younger of Scilarie* 1823
Peter, John, *Keithick House* 1828
Peterkin, John G., *of Grange* 1826
Philp, John, Distiller, *Dolls* 1828
Pillans, James, Merchant, *Leith* 1799
Pitcairn, John, *of Pitcairne* 1815
Playfair, William Henry, Architect, *Edinburgh* 1824
Pollock, Arthur, Merchant, *Grangemouth* 1815
1380 Pringle, Alexander, *of Whytbank*, M. P. *for Selkirkshire* 1821
Pringle, James, *of Torwoodlee* 1806
Pringle, Captain James, R. N., *younger of Torwoodlee* 1820
Pringle, John, *of Clifton* 1819
Prentice, Richard, Solicitor-at-law 1817
Proctor, William D., *of Hallcarton* 1829

† QUEENSBERRY, The Most Noble Charles, Marquis of, K. T. 1799

† ROSEBERY, The Right Honourable Archibald John, Earl of 1806
ROSLYN, The Right Honourable James, Earl of, G. C. B. 1787
REAY, The Right Honourable Eric, Lord 1800
RUTHVEN, The Right Honourable James, Lord 1810
ROBERTSON, The Honourable Lord 1798
RATTRAY, The Honourable Baron Clerk 1812
RAE, The Right Honourable Sir William, *of St. Catharines*, Bart. 1802
RAMSAY, The Honourable Colonel John, *of Dysart* 1824
RAMSAY, Sir James, *of Banff*, Bart. 1823
RIDDELL, Sir James Mills, *of Sunart*, Bart. 1808
RAMSAY, Sir Alexander, *of Balmain*, Bart. 1813
RADCLIFFE, Sir Joseph, Bart. *of Milnsbridge, Yorkshire* 1820
Rae, John, Factor at Græmsay 1804
1400 Ramsay, Alexander, *of Demerara* 1806

		Admitted
	Ramsay, John, *of Barra*	1813
	Ramsay, R. Wardlaw, *of Whitehill and Tillicoultry*	1828
	Ramsay, Captain Thomas, *Balbegno Castle*	1828
	Ramsay, William Ramsay, *of Barnton*	1831
	Rattray, Robert, W. S.	1805
	Rattray, Robert Clerk, *younger of Craighall Rattray*, Advocate	1826
	Reid, Gabriel, *of Kilcalmkill*	1820
	Reid, George, *late of Ratho Bank*	1813
	Reid, John, Merchant, *Leith*	1813
1410	Reid, Sylvester, W. S. Depute Clerk of Teinds	1821
	Rennie, John, *of Phantassie*	1822
	Renny, Robert Walker, Factor on the estate of Pitfour,	1827
	Renny, William, W. S. Solicitor of Legacy Duties	1820
	Reoch, James, Merchant, *Leith*	1826
	Richardson, John, *of Pitfour*	1823
	Richardson, Ralph, Merchant, *Edinburgh*	1828
	Rickman, Thomas, Architect, *Birmingham*, F. S. A.	1831
	Riddell, Campbell D., Advocate	1816
	Riddell, John, Advocate	1817
1420	Rigg, J. Home, *of Morton and Downfield*	1824
	Ritchie, Henry *of Busbie*	1820
	Robertson, Alexander, W. S.	1825
	Robertson, Captain, *of Kendrochet*, late of 88th Regiment	1825
	Robertson, David, Agent for the British Linen Company, *Perth*	1829
	Robertson, Captain George, of the Honourable East India Company's Service	1817
	Robertson, George, one of the Keepers of the General Records of Scotland	1819
	Robertson, James Stewart, *of Edradynate*	1811
	Robertson, James Saunders, W. S.	1816
	Robertson, Captain James Walker, R. N.	1823
1430	Robertson, James H., Banker, *Greenock*	1831
	Robertson, John, *Edmond House, Kelso*	1831
	Robertson, Captain John, *of Tullybelton*	1797
	Robertson, Captain John, late 14th Foot	1825
	Robertson, Laurence, Cashier for the Royal Bank, *Glasgow*	1828
	Robertson, Patrick, Advocate	1816
	Robertson, Robert, *of Auchleeks*	1828
	Robertson, William, *younger of Kinloch-moidart*, Advocate	1826
	Robinson, George Garden, *Banff*	1811
	Robinson, William, *Banff*	1829

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		Admitted
1440	Robison, John, *Atholl Crescent, Edinburgh*	1830
	Robson, Charles, *of Saniston*	1823
	Robson, Charles jun., *at Lordenlam*	1826
	Roger, William, Merchant, *Glasgow*	1825
	Rogerson, Dr John, *of Wamphray*	1804
	Rogerson, William, *of Gillethie*	1829
	Rose, Hugh, *of Holm*	1823
	Rose, Hugh, *of Glastullich*	1824
	Rose, Colonel John, *of Castlehill*	1831
	Rose, William B. *of Rhynie*	1821
1450	Ross, Charles, *of Invercarron*, one of the Commissaries of Edinburgh	1821
	Ross, Richard Louthian, *of Staffold*	1804
	Ross, Walter, *of Nigg*	1802
	Ross, William, *of Bridgebank*	1803
	Roy, John James, Factor on the estate of Invercauld	1825
	Roy, Robert, W. S.	1822
	Russel, Claud, Accountant, Auditor of Accounts to the Society	1807
	Russel, John, W. S.	1806
	Ryrie, Stewart, of the Commissariat Department	1824
	Sussex, His Royal Highness Prince Augustus Frederick, Duke of,	1806
1460 §	Stafford, The Most Noble Elizabeth, Marchioness of	1784
†	Stafford, The Most Noble George Granville, Marquis of, K. G.	1787
	Strathmore, The Right Honourable Thomas, Earl of	1820
	Selkirk, The Right Honourable Earl of	1830
	Stirling, The Right Honourable Alexander, Earl of	1825
†	Strathallan, The Right Honourable James, Viscount	1811
†	Saltoun, The Right Honourable Alexander George, Lord	1820
	Sinclair, The Right Honourable Charles, Lord	1829
	Strathavon, The Right Honourable Charles, Lord	1819
	Stuart, The Right Honourable Lord James, M. P.	1819
1470	Shepherd, The Right Honourable Sir Samuel,	1820
†§	Sinclair, The Right Hon. Sir John, *of Ulster*, Bart.	1784
	Sinclair, Major, The Honourable James,	1824
	Stewart, Major-General The Honourable William,	1826
	Stewart, The Honourable Charles	1826
	Stuart, The Honourable John	1824

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		Admitted
	SANDILANDS, The Honourable Robert, *of Torphichen*	1881
	STIRLING, Sir Samuel, *of Glorat*, Bart.	1809
	STEWART, Sir M. Shaw, *of Greenock and Blackhall*, Bart. M. P. for Renfrewshire	1814
	SCOTT, Sir William, *of Ancrum*, Bart.	1829
1480	STEWART, Sir John Archibald, *of Grandtully*, Bart.	1819
	STIRLING, Sir Gilbert, *of Rosehall*, Bart.	1806
	STEUART, Sir Henry, *of Allanton*, Bart.	1802
	SCOTT, Sir Walter, *of Abbotsford*, Bart.	1815
	Sandeman, David George, *of Springland*	1810
	Sanders, James, M. D. *Edinburgh*	1818
	Sandford, Erskine Douglas, Advocate	1827
	Sands, James, *at Blarcowhook*	1817
	Sands, William J., H. E. I. C. Civil Service, *Bengal*	1829
	Savigny, John Horatio, late *Upper Braid*	1823
1490	Scarth, James, Merchant, *Leith*	1828
	Sceales, Andrew, of the Customs, *Leith*	1828
	Scot, Alexander, *of Trinity Mains*, W. S.	1818
	Scott, Alexander, of the Iron Foundry, *Dumfries*	1826
	Scott, Charles B. *of Woll*, W. S.	1826
	Scott, Charles, Merchant, *Greenock*	1831
	Scott, David, of Bengal Civil Service	1823
	Scott, Lieutenant-Colonel George, *Edinburgh*	1821
	Scott, George Robertson, *of Benholm and Hedderwick*	1823
	Scott, Henry Francis, *younger of Harden*, M. P. for Roxburghshire	1829
1500	Scott, James, *of Brotherton*	1805
	Scott, John Cense, *of Sinton*	1818
	Scott, John, *of Hawkhill*	1830
	Scott, John, *younger of Hawkhill*, Merchant, *Greenock*	1826
	Scott, Captain Robert, *of Abbothame*	1826
	Scott, Lieutenant-General Thomas, *of Mulbeny*	1824
	Scott, Thomas Bensie, Factor to Lord Douglas	1827
	Scrymsour, James Fothringham, *of Teading*	1829
	Selkrig, Charles, Accountant, *Edinburgh*	1810
	Sellar, Patrick, *of Westfield*	1813
1510	Shairp, Major Norman, *younger of Houston*	1828
	Shand, William, *of Arnhall*	1827
	Shanklie, John, Merchant, *Edinburgh*	1831
	Sharpe, Lieutenant-General M., *of Hoddam*	1830
	Shaw, Duncan, Factor to Lord Macdonald	1815
	Shearer, James, *of Buchrannie*	1800
	Shepherd, James, W. S.	1828

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		Admitted
1830	Shepperd, Alexander, Solicitor, *Inverness*	1819
1826	Sheriff, Charles, Sheriff-Substitute, *Orkney*	1823
1827	Short, Francis, *of Courance*	1804
1830	Simpson, Alexander, *at Helmsdale*	1821
1826	Simpson, Alexander, *Leith*	1828
1813	Simpson, Alexander Horatio, *Paisley*	1830
1824	Simpson, Donald, *Dingwall*	1830
1805	Simpson, Captain Hugh, *of Bilsta*	1802
1807	Sinclair, Dugald, Civil-Engineer	1826
1831	Sinclair, George, *younger of Ulbster*	1812
1809	Sinclair, James, *of Fors*	1830
1811	Sinclair, John, *of Barrock*	1824
1805	Sinclair, Robert, Merchant, *Glasgow*	1826
1827	Sinclair, William, *Kelwick*	1811
1825	Singer, Reverend William, D.D., *Kirkintilloch*	1808
1794	Skene, George, *younger of Rubislaw*	1831
1821	Skene, Patrick George, *of Hallyards*	1825
1823	Skene, William, *Rubislaw*	1831
1827	Skene, William Gordon Cumming, *of Pitlurg and Dyce*	1830
1817	Skinner, C. G. Macgregor, *Aberlour House, Banffshire*	1823
1799	Skinner, James, H.P. 92nd Regiment, Factor to the Duke of Gordon	1827
1803	Sligo, George, *of Auldhame*	1827
1822	Sligo, John, *of Carmyle*	1827
1822	Small, Patrick, *of Dirlton*	1826
1829	Smith, Alexander, *of Glenmillan*, Advocate, Aberdeen	1822
1823	Smith, George, *Moffat*, Surgeon, R.N.	1829
1821	Smith, James, *of Jordanhill*	1823
1825	Smith, James, Manager of the Deanston Cotton Works	1821
1801	Smith, James, *of Cruigend*	1825
1799	Smith, James, Merchant, *Leith*	1801
1788	Smith, John, *Swinridge*, Esq.	1799
1810	Smith, John, *of Dalquharran*	1788
1823	Smith, William, late M. P. for Norwich, Honorary Member	1810
1818	Smith, William, Merchant, *Glasgow*	1823
1826	Smollett, J. R. *of Bonhill*, Captain R.N.	1818
1819	Smollett, Alexander, *younger of Bonhill*, Advocate	1826
1810	Speid, Robert, *of Arthrois*	1819
1790	Spiers, Archibald, *of Elderslie*	1810
1812	Spens, Lieutenant-Colonel James, late 73d Regiment	1790
1830	Spottiswoode, John, *of Spottiswoode*	1812
1820	Sprot, James, *of Sprot*	1830
	Sprot, Patrick Maxwell, Merchant,	
	Sprot, John, *Picardy Place*, Edinburgh	1820
	Sprot, Mark, *of Garnkirk*, Advocate	

Admitted

Sprot, Mark, *of Riddell*, Solicitor, Jedburgh 1830
Sprot, Thomas, W.S., Sheriff-Substitute, Orkney 1826
Stavert, Thomas, *of Hosecoat* Francis, of Currance 1827
Steele, William, Advocate, Alexander, of Helmsdale 1826
Stephens, Henry, *Balmadies* Alexander, Leith 1826
Stevenson, Alexander, Alexander Horatio, 1813
Stevenson, Duncan, Professor of the University of Edinburgh 1824
Stevenson, Captain Hugh, late Argyleshire Militia 1805
Stevenson, Robert, Civil-Engineer, Edinburgh 1807
Stevenson, Thomas, Merchant, Leith 1831
Stewart, Allen, *of Bonrannoch* James, of Fore 1809
Stewart, Alexander, *of Balnakeilly* John, of Barrock 1811
Stewart, Alexander, *of Dercullich* Robert, Merchant 1805
Stewart, Captain Alexander, *of Strathgarry* William 1808
Stewart, Archibald, *of Castle Forrie* Reverend William 1827
Stewart, Charles Campbell, George, younger of Ballachulish 1825
Stewart, Charles, *of Ardshiel* Patrick George, of Ardshiel 1794
Stewart, Charles, *of Shierglass* William, Rubislaw 1821
Stewart, Charles, *of Hillside* William Gordon Cummin 1823
Stewart, Charles, *of Ballachulish* C. G. Macgregor 1827
Stewart, Donald, Factor on the estate of Harris Jarnes 1817
Stewart, Captain Dugald George, of Auldhame 1799
Stewart, Duncan, *of Glenbuckie* John, of Carnaig 1803
Stewart, Duncan, Writer, *Edinburgh* Patrick, of Dunkeld 1823
Stewart, Hope, *of Balhaldie* Alexander, of Glenmillan 1823
Stewart, Captain Houston, Surgeon, Bengal George, Moffat 1822
Stewart, Major James Alston, *of Glenlomond* James, of Glenlomond 1827
Stewart, James, Merchant, *Crieff* James, Manager 1825
Stewart, Captain James, *of Crossmount* James, of Crossmount 1821
Stewart, John, *of Belladrum* James, of Belladrum 1819
Stewart, John Lorn, *younger of Glenbuckie* John, Stonehaven 1824
Stewart, John, *of Dalguise* Thomas, Banker, London 1823
Stewart, John, late M. P. for Kirkcudbright, Advocate William, Merchant 1816
Stewart, John, *of Fasnadyle* William, Merchant, Glasgow 1817
Stewart, John, *of Hunt* J. R. of Bonhill, Captain 1809
Stewart, John, *late of Shierglass* Alexander, young 1809
Stewart, Captain John, of the Pr. of Wales's Fencible Cavalry 1809
Stewart, John *of Crossmount* Archibald, of Kilvarie 1801
Stewart, Major Ludovick, Lieutenant-Colonel 1824
Stewart, Patrick Maxwell, Merchant, Leith John, Stewartfield 1806
Stewart, Patrick, *of Monkhall* John, Pitcairly Place 1813
Stewart, Pat. G., Agent for the Bank of Scotland, Perth 1829

		Admitted
	Stewart, Robert, *younger of Ardvoirlich*	1823
	Stewart, Robert, *of Stewarthall*	1825
	Stewart, Robert, *of Alderston*	1828
	Stewart, Robert, *of Clochfoildich*	1819
	Stewart, Stair, *of Physgill*	1828
	Stewart, William, *of Ardvoirlich*	1799
	Stewart, William, Sheriff-clerk, *Kincardineshire*	1825
	Stewart, William, *Mains of Skellater*	1829
1610	Stirling, Lieut.-Gen. A. Graham, *of Duchray and Auchyle*	1801
	Stirling, Alexander Gartshore, *of Craigbarnet*	1818
	Stirling, Charles, *of Kenmore*	1803
	Stirling, Major-General James, late 42d Regiment	1820
	Stirling, James, *of Kier*	1796
	Stirling, John, *of Blackgrange*	1818
	Stirling, John, *of Kippendavie*	1814
	Stirling, Patrick, *younger of Kippendavie*	1813
	Stirling, Thomas Graham, *of Airth*	1814
	Stirling, Major William Moray, *of Ardoch*	1825
1620	Stirling, William, *of Content*	1823
	Stoddart, Alexander, *of Ballendreck*	1829
	Stodart, John *Cartland Mains*	1829
	Strang, William, *Lopness, Orkney*	1819
	Straton, Major-General, *of Kirkside*, C. B.	1827
	Stronach, John, *at Muiryfolds*, Factor to the Earl of Fife	1823
	Stuart, James, *of Dunearn*	1823
	Stuart, James, S. S. C.	1822
	Swan, James, W. S.	1813
	Swinton, Archibald, W. S.	1800
1630	Swinton, John, *Inverleith Place*	1810
	Swinton, Samuel, *of Allanbank*	1829
	Sym, David, *of Coultermains*	1827
	Symons, John, M. D. *Dumfries*	1829

T

†	TWEEDALE, Most Noble George, Marquis of, K. T.	1809
	TRAQUAIR, The Right Honourable Charles, Earl of	1811
	TORPHICHEN, The Right Honourable James, Lord	1821
	TURING, Sir Robert, *of Foveran*, Bart.	1802
	Tait, Craufurd, *of Harviestoun*	1800
	Tait, George, Advocate	1808
1640	Tait, George, *of Langrig*	1825
	Tait, John, *younger of Pirn*, W. S.	1816
	Tait, William, *of Pirn*	1814

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		Admitted
	Tawse, John, *York Place, Edinburgh*	1799
	Tawse, John, Advocate, Secretary to the Society for propagating Christian Knowledge	1825
	Taylor, Major Alexander Francis, *Rothiemay House*	1814
	Taylor, Andrew, *Westbarns, Haddingtonshire*	1817
	Taylor, Robert, *Blackness*	1819
	Taylor, William, *of Troqueerholm*	1823
	Taylor, William, Merchant, *Leith*	1828
1650	Thom, Robert, Civil Engineer, *Rothesay*	1818
	Thomson, Alexander, *of Banchory,* Advocate	1821
	Thomson, Alexander, Banker, *Greenock*	1825
	Thomson, Andrew, *younger of Kinloch,* W. S.	1824
	Thomson, David, W. S.	1809
	Thomson, David, *of Orkie,* W. S.	1825
	Thomson, James, *younger of Earnslaw*	1828
	Thomson, John, Bookseller, *Edinburgh*	1811
	Thomson, John Deas, Commissioner Royal Navy	1801
	Thomson, Thomas, Advocate, Principal Clerk of Session	1807
1660	**Thomson, William,** *of Woodhouse*	1828
	Thorburn, John, S. S. C.	1827
	Threshie, David Scott, W. S.	1824
	Thriepland, Patrick Murray, *younger of Fingask*	1824
	Tod, George, S. S. C.	1800
	Tod, Hugh, W. S.	1817
	Tod, Peter, *of Meikleholmside*	1829
	Torrance, George Macmicken, *of Kusauntinian*	1827
	Traill, George, *younger of Ratter,* M. P. for Orkney	1822
	Traill, James, *of Ratter,* Sheriff of Caithness	1797
1670	**Trail, William,** *of Woodwick, Orkney*	1821
	Trotter, Alexander, *of Dreghorn*	1822
	Trotter, Captain Kobert Knox, *younger of Ballindean*	1829
	Trotter, John P., Advocate	1831
	Trotter, Thomas, *younger of Crooksfield,* W. S.	1828
	Trotter, William, *of Ballindean*	1814
	Trotter, Young, *of Crooksfield*	1828
	Turnbull, Archibald, *Perth*	1826
	Turner, Geo., *of Menie,* Lieut. Col. Royal Horse Artillery	1828
	Turner, John, *of Turnerhall,* W. S.	1825
1680	Turner, William, Surgeon, *Greenock*	1831
	Tytler, William Fraser, *of Balnain and Burdsyards,* Sheriff of Inverness-shire	1802

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Veitch, Henry, *of Elliock* 1802
Veitch, James, *younger of Elliock* 1922
Vere, Daniel, *of Stonebyres*, Advocate 1807
Vere, James J. Hope, *of Craigiehall*, M. P. 1816
Vyse, Lieut. Col. Richard William Howard 1804

W

1690 **Wellington**, Field-Marshal His Grace Arthur, Duke of, Honorary Member 1815
† **Wemyss and March**, The Right Hon. Francis, Earl of 1793
† **Willoughby de Eresby & Gwydir**, The Right Hon. P. Drummond Burrell, Lord 1808
Warrender, The Right Hon. Sir George, *of Lochend*, Bart. M. P. 1804
Walker, Sir Patrick, *of Coates*, Knight, Usher of the White Rod 1803
Wood, Commissary-General Sir Gabriel, Knight 1830
Waddel, George, *of Ballochnie*, W. S. 1824
Waddel, William, *of Easter Moffat*, W. S. 1818
Waldie, Archibald, Agent for the Commercial Banking Company, Kelso 1824
Waldie, John, *of Henderside* 1826
1700 **Walker**, James, Wine Merchant, *Leith* 1800
Walkinshaw, Robert, *of Parkhouse*, Sheriff-clerk of Renfrewshire 1828
Wallace, Robert, *of Kelly* 1825
Warden, Robert, *of Parkhill* 1820
Wardrope, John, Banker, *Edinburgh* 1807
Warran, Edward Ord, *of Horley Hall, Essex* 1829
Watson, Alexander, *of Turin* 1795
Watson, Andrew, *of Bridge Castle*, W. S. 1798
Watson, David, S. S. C. 1816
Watson, George, Portrait Painter, *Edinburgh* 1826
1710 **Watson**, George, Sheriff-substitute of Kincardineshire 1793

		Admitted
	Watson, Hugh, *Keillor*	1828
	Watson, James, Factor to Lord Dundas	1804
	Watson, John, Manager of the Edin. Gas Light Company	1825
	Watson, Walter, *Charlotte Square*	1795
	Watson, William Dickson, *Isle of Eigg*	1810
	Watt, James, *of Crawfordsdyke*	1825
	Wauchope, George, *Moray Place*	1824
	Wauchope, John, *of Edmonstone*	1813
	Waugh, John, Bookseller, *Edinburgh*	1828
1720	Wedderburn, David, *of Pearse*	1831
	Wedderburn, Henry S., *of Wedderburn and Birkhill*	1819
	Wedderburn, John, *Devonshire Street, Portland Place, London*	1819
	Wedderburn, Peter, *of Newgrange*	1826
	Weir, Mathew, W. S.	1822
	Welsh, David *of Collin*, W. S.	1830
	Welsh, James, *at Earlshaugh*	1826
	Welsh, Robert, S. S. C.	1830
	Wemyss, James, W. S.	1825
	Wemyss, James, *of Wemyss*, M. P. *for Fifeshire*, Capt. R. N.	1823
1730	Wemyss, William, *Cuillehill*	1829
	Whigham, George, *of Hallidayhill*	1816
	Whigham, Robert, *of Lochpatrick*, Advocate	1827
	White, Adam, *of Fens*, Merchant, *Leith*	1801
	White, Alexander, Merchant, *Leith*	1829
	White, John, Merchant, *Edinburgh*	1806
	Whyte, Thomas, *of Gleneslin*	1829
	Wightman, James, *of Cowrance*	1827
	Wilkie, John, *of Foulden*	1830
1740	Wilkie, William, *of Ormistonhill*	1824
	Williamson, Lieut.-Col. Benjamin, *of Marlefield*	1803
	Williamson, Lieut. Col. David, late of the 92d Regiment	1826
	Williamson, John W., Agent for the British Linen Company, *Kinross*	1829
	Williamson, Thomas, Merchant, *Leith*	1803
	Wilson, Francis, W. S.	1809
	Wilson, George, *of Innsmarnisk*	1826
	Wilson, James, Sheriff-clerk, County of Edinburgh	1822
	Wilson, John, *of Thornly*	1830
	Wilson, John, *of Cumledge*	1828
1750	Wilson, William Rae, *of Kelvinbank*	1807
	Wilson, William, Factor for the Earl of Glasgow	1804
	Wilson, Wilson Doble, Advocate	1827

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		Admitted
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	Wood, George, M. D. *Edinburgh*	1815
	Wood, William, Merchant, *Leith*	1828
	Woodburn, William, Commissioner on the Estates of Nithsdale and Terregles	1829
	Wooley, Richard, *Wester Daley*	1821
	Wright, James, *of Lawton*	1817
	Wright, Thomas Guthrie, Auditor of Accounts, Court of Session	1824
1760	Wyld, James, *of Gilston*, Merchant, *Leith*	1802
	Wylie, David, *Cumberland Street, Edinburgh*	1825
	Young, Alexander, *of Harburn*	1810
	Young, Archibald, *Banff*	1825
	Young, John, *of Cliesh*	1807
	Young, Maitland, Merchant, *Greenock*	1831
	Young, Samuel D., *of Gullyhill*	1826
	Young, William, *of Burghead*	1813
	Young, William, W. S.	1821
	Younger, William, *of Craigielands*	1826
1770	Yule, Captain Patrick, Royal Engineers	1827
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PREMIUMS

OFFERED BY

THE HIGHLAND SOCIETY OF SCOTLAND,

FOR PROMOTING

AGRICULTURE AND INTERNAL IMPROVEMENT IN SCOTLAND,

IN

1830.

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PRELIMINARY NOTICE.

The business of The Highland Society of Scotland is conducted by a President, Four Vice-Presidents, Thirty Ordinary, and Ten Extraordinary Directors, a Treasurer, and Principal and Depute Secretaries, to which latter all communications are addressed. The Ordinary Directors are subdivided into Committees for the despatch of business, assisted occasionally by those Ordinary Members most conversant with the subjects to be discussed. The Report of each Committee is brought before the Directors collectively for farther procedure, and these proceedings are again submitted for approbation to a half-yearly General Meeting of the Society. New members are admitted at the General Meetings by ballot. They pay a small annual contribution of £1 : 3 : 6, or, in their option, and in full of all future claims, a life-subscription of Twelve Guineas. All Meetings of Directors, or Committees, are open; and at these, any member may attend and deliver his opinion on the subjects under consideration, though, in cases of division, the Directors or Members of the Committees only are entitled to vote. Members have access to the Society's Library, which is annually increasing, by the purchase or donation of books connected with the purposes of the institution.

When the Highland Society of Scotland was instituted in the year 1784, the object chiefly contemplated was the improvement of the Highlands—and hence its name. But the great increase in the number of its Members since that time, the happy management of its funds, and the change in the general state of the country, have long enabled it to extend the design of its first institution, and direct attention to every part of North Britain where industry might be excited, or the useful arts improved.

The Society has, neither by its Charter of Incorporation, nor by its subsequent practice, been limited in its patronage to any one department of industry; but it has regarded, as the fitting objects of encouragement, every application of useful labour which might tend to the general good. But although its patronage be thus extended as regards its objects, circumstances have arisen to modify, in some cases, the application of it. The establishment of certain Boards, as that for the encouragement of the Herring Fishery, and the like, has induced the Society to restrict its original views, and to devote its attention, and apply its funds, in a more especial manner to other objects, and chiefly to Agriculture and Rural Economy in their various branches.

In fulfilment of its purposes, the Society is every year accustomed to offer and award a variety of Premiums, as the means of eliciting and diffusing knowledge, as incitements to industry, or as the rewards for useful undertakings. These relate to every subject which may be supposed to fall within the plan of the Institution:—such are, the improvement of the Waste Lands of the country, by Tillage, by Irrigation, or by Draining,—the Extension of Plantations, as the objects of ultimate profit, or of present embellishment and shelter,—the improve-

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ment of the breeds of Live Stock, and of the qualities of Wool,—the encouragement of certain domestic Manufactures,—the invention of Useful Machines,—and, not the least in interest and importance, the awakening the Industry of the Lower Ranks to such pursuits as shall promote their content, by ameliorating their condition.

Although certain subjects be thus selected as the objects of experiment or discussion, the patronage of the Society is not restricted to these objects. Its purpose being the promotion of general industry and improvement, it receives with favour every beneficial communication and every statement of facts which may admit of an useful application. A Mechanical department exists for rewarding the original invention or subsequent improvement of all machines and implements for Agricultural purposes, the construction of those for other branches of Rural Economy, and of some for domestic convenience. Models of these are received and preserved; and it is proposed, that, for the future, descriptions shall as speedily as possible be conveyed to the Public of all such as may merit attention.

The Transactions of the Society were formerly printed by Volumes:—Six were published in that form, which may be had of Messrs CADELL and Co. of Edinburgh, successors to the interest held by Messrs CONSTABLE and Co. in the Copy-right, and by whom they will be furnished to Members at 25 per cent. under the selling price.

The papers of the Society now appear periodically in "THE QUARTERLY JOURNAL OF AGRICULTURE, AND THE PRIZE-ESSAYS AND TRANSACTIONS OF THE HIGHLAND SOCIETY OF SCOTLAND," published by Mr BLACKWOOD of Edinburgh, Mr CADELL of London, and Messrs CURRY and Co. Dublin.

All Communications relating to Premiums, and other subjects for the consideration of the Directors, are to be addressed to CHARLES GORDON, Esq. Depute-Secretary, at the Society's Hall, Albyn Place, Edinburgh.

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NOTICE TO CANDIDATES,

AND GENERAL REGULATIONS OF COMPETITION.

When subjects are specially selected for competition, it is always to be understood, 1*st*, That, however concisely the subjects themselves be announced, ample information is required concerning them: 2*d*, That this information shall be founded on experience or observations, and not on simple references and quotations from books: 3*d*, That it shall be digested as methodically as possible; and, 4*th*, That Drawings, Specimens, or Models adapted to a defined scale, shall accompany Writings requiring them for illustration.

Certain conditions are annexed to each of the various subjects of competition, as detailed in the List of Premiums; and these are rigidly enforced by the Society, as the only means of ensuring regularity in the conduct of the business, and of distributing exact justice among the competitors.

In all Essays for Competition, it is expected that when facts not generally known are stated, they are to be authenticated by proper references. Competitors in Essays shall not communicate their names, but shall transmit along with the Essays a sealed note containing their names and addresses, and inscribed on the back with some distinguishing motto or device, which shall also be inscribed on the Essay. When this regulation is neglected, such Essay shall not be received in competition. If the Essayist has formerly gained a Premium from the Society for a Paper communicated by him, it is recommended that his subsequent Essay shall be written in a different hand from that of the former successful Paper.

None of the sealed notes, except those which bear the distinguishing motto or device of the Essays found entitled to Premiums shall be opened, and the sealed note will not in any instance be opened, without consent of the author, unless a Premium equal to at least one-half of the sum offered shall have been adjudged: But should no application be made for the Paper on or before the 1st of March in each year, it will be held as belonging to the Society on the terms proposed. Such Essays as are not found entitled to any Premium shall, with the sealed notes, be returned to the authors, if required. The Society is to be at liberty to publish the Essays, or extracts from them, for which the Premium, or part of it, shall be awarded.

Candidates are requested to observe, that, in any instance, when Essays, Reports, or Certificates, are unsatisfactory, the Society is not bound to give the reward offered; and that, in certain cases, power is reserved of giving such part only of a Premium as the claim may be adjudged to deserve; but competitors may feel assured that the Directors will always be inclined to judge liberally of their several claims.

In all Reports of Experiments relating to the Improvement or Management of Land, it is expected that the *expenses* shall be accurately detailed. When Machines or Models are transmitted, it must be stated whether they have been elsewhere exhibited or described.

In all Premiums offered, having reference to Weight or Measure, the New or Imperial Standards are alone to be understood as referred to; and should Competitors in any instance refer to other Weights or Measures, the exact proportion which these bear to the New Standards must be accurately specified, otherwise the claim will not be entertained.

When the Premiums are awarded in Plate, the Society will, in such cases as the Directors may see proper, allow them to be paid in Money, on the application of the successful Candidates.

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OFFICERS AND DIRECTORS, 1830.

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Messrs LEWIS and CHARLES GORDON, Depute Secretaries and Collectors.

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Mr WILLIAM DICK, Lecturer at the Veterinary School.

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According to priority in date of Election.

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* H. Home Drummond, Esq. of Blair Drummond, M. P.

*Those marked thus *, were elected at last Anniversary Meeting.*

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PREMIUMS, &c.

Highland Society Hall,
Edinburgh, February 15. 1830.

THE HIGHLAND SOCIETY OF SCOTLAND does hereby advertise, That the under-mentioned PREMIUMS are to be given by the Society in the year 1830, &c.

ESSAYS AND REPORTS.

1. APPLICATION OF LIME.

A Piece of Plate, of Twenty Sovereigns value, will be given for the best and approved Essay, founded on experiment in Scotland, on the most beneficial mode of applying Lime to the different varieties of Soil, under various descriptions of Culture and Crop, both with respect to the quantity and to the frequency of the application.

The Essays to be accompanied by an analysis of the lime employed, or a sample of the limestone, in the unburned state, from which it had been made. The Essay to be lodged on or before 20th October 1830.

2. STOCKING OF PASTURES.

A Piece of Plate, of Twenty Sovereigns value, will be given for the best and approved Essay, founded upon experience in Scotland, regarding the proportion, species, and description of Live Stock which may be most advantageously pastured together in enclosed grass land.

A principal object to be had in view, is the clean eating of the grass, with a due regard, at the same time, to the fattening and thriving of the different animals, and the periods found best for opening and

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shutting up such pasture lands. A particular statement will be required of the number, age, or value of the animals when put to grass; the length of time they were severally pastured, and their price or value when removed, with any other information which may tend to elicit the object in view. It is also required that the extent of pasture in each enclosure be specified, with the nature of the soil, surface, length of time in pasture, and mode of management when laid out for grass. It will farther be desirable, in as far as competititors can conveniently ascertain, to know the particular grasses that constitute the pasture, and any thing remarkable in regard to the destruction of weeds, should such have been found troublesome. The Essay to be lodged by 20th October 1830.

3. DISEASE IN CATTLE CALLED THE "RED-WATER."

A Gold Medal, or Ten Sovereigns, will be given for the best and approved Essay upon the Causes, Prevention, and Cure of that disorder in Cattle called the Red-water, or Moor-ill.

The Essay to advert to the description of cattle most liable to be attacked with this disorder—the season of the year, and the kind of food most likely to cause it; and likewise to describe the morbid appearance of those cattle that die of this disease, and more particularly of the parts affected. The Essay to be lodged by 20th October 1830.

4. DISEASE IN SHEEP CALLED "THE LOUPING ILL."

A Gold Medal, or Ten Sovereigns, will be given for the most correct statement of well-authenticated facts, relative to the disease in Sheep, known in the south-border counties by the name of the "Louping-ill," divided into the following heads, viz.

The varieties of the disease, the appearance externally, and on dissection; on what soils it appears most frequently, and if any soil is quite exempt from it; the period of the year when the disease is most prevalent; the state of the atmosphere in regard to humidity, cold, and wind: Is it induced by change of pasture, and how? What preventives or what remedies have been attempted, and the success that has attended them; what effect the size of the animal has upon the disease; and, in general, any other information tending to elucidate the subject. The Report to be lodged by 20th October 1830.

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5. DISEASE OF "FOOT-ROT" IN SHEEP.

A Gold Medal, or Ten Sovereigns, will be given for the most correct account of well-authenticated facts, relative to the disease in Sheep denominated the "Foot-rot," bearing upon the following points:—

The varieties of the disease, what are its first symptoms, and how far it affects the general health of the animal. The cause, so far as is supposed; the reasons for assigning such cause as the actual one. Whether the disease is in any degree hereditary or contagious, and whether an animal having once had it is more susceptible of a return. What is the precise seat of the disease, and in what season of the year is the animal most subject to be attacked. The preventives most usually adopted, and to what extent they have been successful. The cure, or the means successfully used in the treatment of the disease. What pastures or soils are most subject to the disease, and if any soil is exempt from it; and, in general, any information that may be of use in the investigation of the complaint. The Essay to be lodged on or before 20th October 1831.

6. COLLECTING AND PRESERVING THE SEEDS OF FOREST TREES.

A Piece of Plate, of Twenty Sovereigns value, will be given for the best and approved Essay (founded as much as possible on the writer's personal experience), on the subject of collecting and preserving the Seeds of Forest Trees, suited to the climate of Scotland; the best mode of extracting the Seeds from the Cones of the Pine Tribe, and the mode of sowing the Seeds, and bringing forward the young Plants, until they are ready for planting out.

It is expected that, in describing the manner of collecting cones and seeds, the proper season for gathering each kind will be pointed out, and the manner of removing them with least injury to the parent tree; also the degree of heat, as indicated by reference to Fahrenheit's thermometer, to which the cones may be subjected, without injury to the vegetative powers of the seed; and that the most easy and economical mode of extracting, cleaning, and preserving the various seeds, will be fully detailed, and the indications pointed out of the fitness of seeds for successful germination. The modes of sowing the different kinds of seeds, and the depth of earth by which they should be covered; the quantity of seed to be

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put on the square yard, or other given measure; the period and mode of transplanting into nursery lines, and the time during which each kind should remain in such lines; with other particulars necessary for showing the best means of bringing the seedlings to the state ready for being planted out, must be satisfactorily detailed.

It is expected, that where the writer does not found the information communicated on his own experience, he will refer to well-authenticated facts. Attention must be especially directed to the trees most valued for their economic uses; but it would be highly desirable also to obtain information regarding any of the rarer species which may seem suited to the climate of the country.

The following deciduous forest trees may be enumerated as claiming attention, and regarding which the author is invited to communicate his remarks, in so far as his experience and means of observation extend: Oak, Ash, Wych or Scotch Elm, English Elm, Beech, Sycamore, Larch, Corsica Pine or Laricio, Sweet Chesnut, Birch, Walnut, Horse Chesnut, Alder, Mountain Ash or Roan, Hornbeam, White Thorn, Elder or Bourtree, Broad-leaved or Scots Laburnum, Swedish Maple, and White Beam. Among evergreen trees may be mentioned Holly, Evergreen Oak, and some of the principal cone-bearing trees, such as the Scotch Fir (best variety), Norway Spruce, Silver Fir, Pinaster, Weymouth Pine, Cedar of Lebanon, White American Spruce, &c. Some kinds of forest trees, which, in this country, are generally propagated by layers or cuttings, may also be noticed as well deserving of attention, namely, Lime-tree, Poplars of different kinds (Lombardy, Black Italian, White Egyptian, Balsam, and Ontario), Willows of different kinds, Tulip-tree, and Oriental and Occidental Plane. The Essay to be lodged by 20th October 1831.

7. FELLING TIMBER.

Fifteen Sovereigns, or a piece of Plate of that value, will be given for the best and approved method, founded upon experiment satisfactorily established, of applying the Saw by Machinery, in cutting down Wood.

The facilities afforded in the manufacture of rough wood into staves and boards, by the adoption of the circular saw, lead the Society to hope that the instrument may be applied in felling young or full-grown trees; and they are therefore induced to propose a Premium, in order to direct attention to the matter. The means employed must be simple, economical, and effective. Reports, ac-

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companied by a Model of the Instrument, to be lodged by 20th October 1831.

8. THE CONSTRUCTION OF WHEEL CARRIAGES EMPLOYED IN AGRICULTURE.

A Piece of Plate, of Twenty-five Sovereigns value, will be given for the best and approved Essay on the Construction of Wheel Carriages employed in Agriculture, founded on experience.

In this Essay the writer will be required to point out the defects in the construction of the Wheel Carriages commonly used, and the means which have been most successfully employed for obviating these defects; his attention is in a particular manner required to be directed to the best construction and position of the wheels,—to the practical effects of dishing and bending the axle,—to the modes of fixing the spokes and fellies,—to the best method of making the carriage, with reference to the facility of loading and unloading,—to the kind and quality of the materials to be used,—and to such other circumstances as may direct the practical artisan in the construction of the Carriage. The Essay to be lodged by 20th October 1831.

9. CONVERTING PEAT INTO FUEL BY COMPRESSION.

There being reason to believe that Peat may by compression be converted into Fuel, not only better calculated for domestic use than that prepared in the common manner, but adapted to various purposes in the arts,—a Premium of Twenty Sovereigns, or a Piece of Plate of that value, will be given for the best account, founded upon experiment, of a simple and economical method of effecting the purpose required.

Reports with the necessary illustrative models or drawings, to be lodged by 20th October 1831.

10. FINE WOOLLED SHEEP.

Fine Wool being absolutely necessary for the manufacture of English Broad Cloth, and there being some reason to believe, that, by particular treatment, the finer woolled breeds of Sheep may be naturalized in Scotland, a Premium of Twenty Sovereigns, or a Piece of Plate of that value, will be given for the best and approved detail, founded upon authentic information or personal observation, of the mode of rearing, feeding, and managing the fine woolled breeds in those parts of the Continent of Europe, which most nearly

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resemble Scotland in climate, shelter, and herbage. Reports to be lodged by 20th October 1832.

11. REPORTS ON IMPROVED RURAL ECONOMY ABROAD.

The honorary Gold or Silver Medal of the Society will be given for the best accounts, founded on personal observation, of any useful practice or practices in rural or domestic economy adopted in other countries, which may seem fitted for being introduced with advantage into Great Britain.

For the most approved communication under this head, which shall be rendered on or before the 20th October in each year, the Society's honorary Gold Medal will be awarded; and for all other communications in the same year, which shall be approved of, the Society's honorary Silver Medal.

However advanced the state of the useful arts may be considered in this kingdom, it is not to be doubted that there are many practices in use, both of domestic and rural economy, in other countries, and particularly in France, the Low Countries, and the North of Germany, highly deserving of attention or imitation, and which yet are too apt to be disregarded or unnoticed by the traveller or casual resident. The purpose chiefly contemplated by the offer of the present premium is to induce gentlemen, who may visit other countries, to take notice of and record such particular practices as may seem calculated to benefit their own country, in the branches of the arts referred to; and it is proposed that the earliest opportunity shall, in all cases, be taken of communicating such details to the public.

12. HONORARY PREMIUM FOR AN ACCOUNT OF ANY DISTRICT IN SCOTLAND.

To the person who shall, on or before the 20th of October, in any year, furnish to the Society the best Account of any District in Scotland, with reference to the present state of Husbandry, and the progress of rural and general improvement,—the Society's Silver Medal, or a Piece of Plate, as the Directors may see fit, in the circumstances of the case.

In describing the present state of Husbandry in the district, the writer is required to advert to the general character of the soil and surface—to direct attention especially to the more recent improvements that have been made, or that may be in progress, in the modes of tillage, the breeds of stock, the state and management of roads, the

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progress of plantations, and the like; and generally to offer such suggestions as may admit of practical application regarding the future improvement of the district.

CONDITIONS OF COMPETITION.

The conditions of Competition for Essays and Reports will be found under the "General Notice to Candidates," prefixed to the List of Premiums, page 7, and to which Competitors are referred.

The Essays and Reports on Subjects 1, 2, 3, and 4, are to be lodged at the Society's Hall, on or before the 20th of October next 1830; those on Subjects 5, 6, 7, 8, and 9, by 20th October 1831; those on Subject 10, by 20th October 1832; and Reports on Subjects 11 and 12, by the 20th of October in any year.

EXPERIMENTS AND IMPROVEMENTS.

CLASS I.

STRAW PLAIT MANUFACTURE.

1. RAISING STRAW FOR THE MANUFACTURE.

For the best specimen, in a bleached state, of Straw raised in Scotland, from the *Grano marzolano*, or kind of wheat cultivated in Tuscany for this purpose; or any other species of wheat affording a culm of equal fineness, pliancy, and toughness—Ten Sovereigns.

CONDITIONS.

The specimens to be put up in bundles of not less than two inches diameter; and to be lodged at the Society's Hall on or before the 10th November 1831, with a narrative of the circumstances of their growth and preservation, and certificates satisfactorily signed, of the facts therein detailed. It is expected that the specimens produced by each competitor shall have been selected from a crop grown to the extent of at least half an acre.

2. BLEACHING STRAW FOR PLAIT.

It having been now established by experiment, that Straw of a quality fit for plaiting can be raised in Scotland, but that there is difficulty in procuring it of a proper colour, from the injury which it often receives from the uncertainty of the weather in the process of bleaching and drying,—the Society being therefore desirous to discover some process of bleaching it, independent of the weather,

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offers a premium of Fifteen Sovereigns for the cheapest and most effectual process by which that end can be attained, without injury to the material.

Reports, detailing the process of Bleaching, with specimens of the Straw so prepared, and satisfactory certificates of its quality, colour, and tenacity, when made into Plait, to be lodged at the Society's Hall by 10th November 1831.

CLASS II.

WASTE LANDS.

1. HONORARY PREMIUM FOR IMPROVEMENT OF LAND FOR TILLAGE.

To the Proprietor or Tenant in Scotland, who shall, on or before the 10th of November in any year, transmit to the Society a satisfactory report of his having, within the period of five years immediately preceding the date of his communication, successfully improved and brought into tillage, an extent of waste and hitherto uncultivated Land, not being less than one hundred acres—The Gold Medal.

The Report may comprehend such general observations on the improvement of Waste Land as the writer's experience may have led him to make; but is required to refer especially to the particular tract reclaimed, to the nature of the soil, the previous state of the ground, the obstacles opposed to its improvement, the mode of management adopted, the expense, and, in so far as can be ascertained, the produce and value of the subsequent crops; and the land must have borne one crop of grain, at least, previous to the year in which the Report is made. The Report must be accompanied by a certified measurement of the ground.

2. DRAINING MOSS AND BOG LAND.

DISTRICT.—*The County of Aberdeen.*

To the Person, in the County of Aberdeen, who shall, between 1st March 1829 and 1st October 1831, have executed, in an effectual manner, the greatest extent, not less than 6000 yards, of Drain, in Moss or Bog Lands, and with a view to the amelioration of the climate, as well as to the improvement of the soil—A Piece of Plate of Twenty Sovereigns value.

For the next greatest extent as aforesaid, not less than 3000 yards—A Piece of Plate of Ten Sovereigns value.

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Competitors will observe, that these Premiums being offered chiefly with a view to the amelioration of the climate, the Society understands them to apply, not to hill and pasture grounds, which may be improved by surface or sheep drains, but to those tracts of flow moss and bog lands, usually situated at a lower level, and frequently with nearly a flat surface; and that to entitle a proprietor to either of the Premiums, in preference to a tenant who shall have executed the drainage chiefly at his own expense, the proprietor must have drained double the extent of the tenant.

The extent of surface drained must not be under forty acres for the first, and twenty acres for the second premium. It is required that the ground so drained shall be effectually cleared of stagnant water and superabundant moisture; and, in as far as circumstances will admit, rendered fit for planting, raising grain, or producing useful herbage for the pasturing of cattle and sheep.

Certificates in favour of Competitors, specifying the above particulars, to be subscribed by two Members of the Society, who shall have seen the state of the ground previous to, and at the conclusion of, the operations, accompanied with a particular account, verified by affidavit, respecting the extent and description of the drains executed, their general depth and width; the state of the ground previous to, at different stages, and conclusion of, the operations; the mode in which the same were executed; the expense—and, in the case of a tenant, what part thereof is allowed by the landlord; with any other circumstances connected with the subject, of which it may appear material that the Society should be informed. Certificates to be transmitted to the Secretary on or before the 10th November 1831.

CLASS III.

CROPS AND CULTURE.

1. NEW PLANTS ADAPTED TO FIELD CULTURE.

To any Person who shall, on or before the 20th October in any year, report to the Society any new species or variety of useful Plant, adapted to the ordinary field culture of Scotland—The Silver Medal, or a Piece of Plate, as the Directors may see fit, in the circumstances of the case.

Satisfactory evidence will be required, that the plant produced is new in the cultivation of the country, either as regards the species or variety, valuable as regards the uses to which it may be applied, and congenial to the soil and climate of Scotland. A particular de-

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tail of the discovery or circumstances which led to the experiment, must be furnished,—the mode of culture described, and a specimen of the plant transmitted.

2. FEEDING OFF TURNIPS BY SHEEP.

The Society being of opinion that the practice which obtains in some districts in England, and of the south of Scotland, of feeding off Turnips on the ground by sheep, may be advantageously introduced into other districts, and in certain soils and situations, offers the following premiums, in the districts after mentioned, viz.

1. *The Crieff District of Perthshire, comprehending the parishes of Crieff, Monyvaird, Strowan, Comrie, Monzie, Madderty, Trinity-Gask, and Fowlis-Wester.*
2. *The Moulinearn, Dunkeld, and Blairgowrie Districts of Perthshire.*
3. *The District of Aberdeenshire and Kincardineshire, on both sides of the river Dee, comprehending the parishes of Nigg, Banchory-Devenick, Maryculter, Peterculter, Durris, Drumoak, Upper Banchory, Strachan, Kincardine O'Neil, Lamphanan, and Aboyne.*
4. *The Stewartry of Kirkcudbright.*

To the Farmer in the First District, who, in the year 1829, shall have cultivated in drill the greatest extent of Turnips, not being under ten acres, in proportion to the extent of his land under the plough that year, and of which at least one-half shall be eat off on the ground by the feeding of sheep, carefully and regularly enclosed with hurdles or nets, and upon land well adapted to the purpose —Ten Sovereigns.

To the Farmer in the First District, who shall cultivate and feed off the next greatest extent as aforesaid, not being less than four acres—Five Sovereigns.

To the Farmer in each of the Second, Third, and Fourth Districts, who shall, in the year 1830, cultivate the greatest extent of Turnips in drill, estimated as aforesaid, not being under ten acres, and of which at least one-half shall be eat off on the ground in manner before specified—Ten Sovereigns.

To the Farmer in each of the Second, Third, and Fourth Districts, who shall cultivate and feed off the next greatest extent, not less than four acres—Five Sovereigns.

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In any portion of the field, reserved to be fed off by sheep, the blanks left by the turnips removed shall not exceed five drills, so as the benefit of this mode of feeding, arising from the treading and manure of the stock so fed, may be distributed over the whole of such portion.

Competitors for the Premiums in the First District will transmit to the Secretary of the Society, on or before 10th November 1830, an affidavit, specifying the extent of ground under the plough in 1829, the extent under turnips that year, the kind or kinds raised, the proportion fed off by sheep, the manner in which it was done, and within what period; description of sheep so fed, and whether they were the claimant's own stock, or were sent for feeding by another; and, in the last case, the price obtained per acre will be stated; the affidavit to be accompanied by a certificate of two Members of this Society, in support of the matters therein detailed.

The like certificates, for the 2d, 3d, and 4th Districts, to be transmitted by 10th November 1831.

3. SOILING SHEEP.

A Gold Medal, or Piece of Plate of Ten Sovereigns value, will be given for the best and approved Report of an Experiment for ascertaining the relative Advantages between the Systems of Soiling and Grazing Sheep.

The Reports will specify the number and description of the Sheep selected for the experiment, and are to be lodged on or before 10th November 1830.

4. CULTIVATION OF FIELD BEET OR MANGEL WORZEL.

A Gold Medal, or Piece of Plate of Ten Sovereigns value, will be given for the best and approved Account of an Experiment, or series of Experiments, on the Cultivation of Mangel Worzel, the best mode of storing and preserving the Root for use, and its application to the purposes of feeding Dairy Cows or other Live Stock.

In this experiment, the nature of the soil, and the kind and quality of manure employed, must be stated, and the period of sowing and general cultivation of the crop distinctly detailed. The extent reported to be cultivated in any single experiment must not be less than two acres; but, for ascertaining the weight of produce, it will be sufficient to weigh the roots of such portion, and so selected as will give a fair average.

Competitors are invited to communicate their opinions, generally on the experience they have acquired, as to how far this plant seems

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suited to the climate and soil of Scotland, and in what respects and cases it may be used beneficially as a substitute for the root plants now in use.

Reports to be lodged with the Secretary by 10th November 1831.

5. EXPERIMENTS WITH SALTPETRE AS A MANURE.

For the best Essay or Report, founded on actual experiment, on the Effects of the application of Nitre or Saltpetre as a Manure or Top-dressing to land under crop, and the nature of its action on the same—A Gold Medal, or Ten Sovereigns.

It would be desirable to distinguish the experiments as made upon the different kinds of crop, such as Wheat, Barley, Oats, Peas, Clover and Rye Grass, Lucerne, Meadows and Pasture Ground. The extent not to be less than one acre, and a comparison made upon one acre more of the same field, using lime, soot, or other top-dressing—the quantities of each manure, period, mode of application, and expense, to be accurately detailed, and the apparent improvement, if any, by the nitre, certified on inspection by two Members of the Society. Reports to be lodged by 10th November 1831.

6. USE OF KELP AS A MANURE.

It being understood that Kelp has of late been applied with much success to land, as a manure, the Society, desirous of bringing its properties fully before the public, hereby offers the following premiums:—

1. For the best Report, founded on experiment, on the application of Kelp as a top-dressing to land under hay or pasture, as compared with a similar application of lime, dung, or other manure, to land under hay or pasture—Ten Sovereigns, or a Piece of Plate of that value.

2. For the best Report, founded on experiment, on the application of Kelp as a manure, to land under white-corn or bean crops, as compared with the application of lime, dung, or any other manure, to land under similar crops—Ten Sovereigns, or a Piece of Plate of that value.

3. For the best Report, founded on experiment, on the application of Kelp as a manure, to land under turnips or potatoes, as compared with the application of lime, dung, or other manure, to land under similar crops—Ten Sovereigns, or a Piece of Plate of that value.

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CONDITIONS.

1. The extent of land to which the kelp is applied in the experiment must not be less in any case than three acres, and the extent of land dressed with the other manures to be compared with the kelp, must in like manner be not less than three acres.

2. The Report must specify the quantity of kelp and of the other manures employed; the expense per acre of the kelp, and the other manures respectively; the time and mode of application; the quantity and value of the produce, and such other particulars as may be necessary to determine the relative value of kelp as compared with other manures. Should the experimenter wish to make a trial with the kelp in combination with other manures, he is invited to do so, but this must be on land exclusive of that to be allotted to the kelp as above.

Reports must be lodged with the Secretary at the Society's Hall, by 31st December 1831.

7. PLOUGHING COMPETITIONS.

The Highland Society finding that premiums to ploughmen for improvement in ploughing, have for some years been given very generally over the country by the resident gentlemen, and Local Agricultural Societies, has, in the mean time, discontinued them; but being desirous of encouraging improvement in this branch of husbandry, the Society will give its Silver Plough-Medal to the ploughman found to be the best at such competition, provided not fewer than fifteen ploughs shall have started. The Medal will be issued upon a report from one or more Members of the Society, who shall have actually attended the competition, stating the number of ploughs that had started, and that the ploughman found to be the best had not received the Society's Medal at a previous competition in the same district.

CLASS IV.

PASTURES.

1. LAYING DOWN LANDS TO PERMANENT PASTURE.

The Gold Medal, or a Piece of Plate, will be given to the Proprietor or Tenant in Scotland, who shall, on or before the 10th of November, in any year, report to the Society the most successful

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experiment in the laying down of land to permanent pasture, either wholly with the indigenous grasses, or with a mixture of these grasses and the clover, or other plants adapted for herbage.

The land which has formed the subject of experiment must have been pastured for at least one season, exclusive of that in which the Report is given in; the extent of the ground must not have been less than ten acres; and a certified account must be transmitted of the kinds and quantity of the grass seeds sown.

In offering this Premium, the Society does not express any opinion regarding the expediency of keeping land in a state of permanent grass, rather than in a course of alternate tillage, nor regarding the supposed superiority of several of the native grasses for the purpose of pasture, over the artificial grasses so long and beneficially employed in Scottish Agriculture. The Society merely proposes to obtain information and promote experiment, and to direct attention to a branch of rural economy supposed to have been hitherto less attended to, and less successfully practised in Scotland, than the alternate Husbandry.

The Reporter, while he is required to state the results of the experiment, to which his own Report refers, is invited to communicate such farther information as his experience enables him to give, regarding the general management of land in a state of perennial pasturage, the means which may be employed for maintaining or increasing the productiveness of the herbage by top-dressing, or otherwise, and the modes which have been found most successful in practice for destroying mosses, and other injurious plants in the sward.

2. COMPARATIVE ADVANTAGES OF LAYING DOWN LANDS TO PASTURE WITH AND WITHOUT A WHITE CROP.

There being reason to believe that the sacrifice of a white crop in laying down lands to pasture, will, in many instances, be counterbalanced by the superior produce of grass, the Society is induced to offer the following premium:—

A Piece of Plate, of Twenty Sovereigns value, will be given for the best and approved comparative Report, founded upon actual experience in Scotland, of Land laid down to pasture with the Indigenous Grasses adapted to the particular soil, *without any white crop*, along with the Grass Seeds; and of Land in similar circumstances of soil, climate, and condition, sown down with the same grasses, *along with a white crop*.

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The extent of land in each experiment not to be less than seven acres; and a particular statement is required of the kinds and quantities of the grass seeds used, with a distinct account of the kind and number of stock pastured upon each field, with their comparative progress in condition, for three successive seasons. The sort of grain sown as white crop must be likewise reported. A hay crop is of course excluded.—Reports to be lodged by the 10th November 1832.

CLASS V.

LIVE STOCK.

I. CATTLE.—BREEDING STOCK.

PREMIUMS FOR IMPROVING THE BREED OF CATTLE IN THE FOLLOWING DISTRICTS.

1. *Wigtonshire.*
2. *The Island of Arran.*
3. *The Districts of Mid and Nether Lorne, in the County of Argyll, comprehending the parishes of Ardchattan and Muckairn; that part of the parishes of Inishail and Kilchrenan, lying north of Loch-Awe; the parishes of Kilmore and Kilbride; the parish of Kilninver; that part of the parish of Kilmelfort lying within the District of Lorne; and the parishes of Kilbrandon and Kilchattan.*
4. *Clackmannanshire, including the parishes of Culross, Fossaway, Tulliallan, Muckhart, Logie, and Glendevon, in the county of Perth; and Alva, in Stirlingshire.*
5. *The following parishes in the counties of Stirling, Dumbarton, and Perth, viz. Drymen, Buchanan, Balfron, Gargunnock, St Ninian's, Kippen, Baldernock, Killearn, Strathblane, Fintry, Kilmaronock, East and West Kilpatrick; that part of Bonhill to the east of the Leven, Dumbarton, Aberfoyle, and Port.*
6. *The District of Kincardineshire, comprehending the parishes of Fettercairn, Fourdoun, Marykirk, Garvock, Laurencekirk, Arbuthnott, Glenbervie, and that part of the parish of Edzell in Kincardineshire.*

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7. *The District of Aberdeenshire, comprehending the parishes of Strathdon, Glenbucket, Cabrach, Towie, Tarland and Migvie, Logie-Coldstone; those parts of the parishes of Coul and Tulloch in Cromar; those parts of the parishes of Glenmuick, Glengairn, and Tullich, and of Crathie, which are on Gardenside and in Morven.*

8. *The District of Buchan, in Aberdeenshire, from the River Ythan on the south, to the River Doveran on the north and west, including also the adjoining parishes of Logie-Buchan, Foveran, and Methlick, in the District of Fomartin.*

9. *The District of Huntly, comprehending the following parishes in the counties of Aberdeen and Banff, viz. Huntly, Cairnie, Gartly, Rhynie, Auchindoir and Kearn, Kildrummie, Clatt, Kinnethmont, Carbach, Glass, Mortlach to the north and east of the rivers Fiddich and Dullan, Boharm, Botriphnie, Drumblade, and Forgue.*

10. *The Eastern District of Forfarshire, comprehending the parishes specified in the List of Premiums of last year.*

11. *The Districts of Morven, Ardnamurchan, Sunart, and Kingerloch, in the county of Argyll.*

12. *The Districts of Moidart, Arisaig, and Knoidart, including the Islands of Eig, Rum, and Canna, in the counties of Inverness and Argyll.*

13. *The Islands of Shetland.*

14. *The West Tiviotdale District, in the counties of Roxburgh and Selkirk, comprehending the parishes of Hobkirk, Kirkton, Cavers, Hawick, Roberton, Wilton, Southdean, Minto, and Lilliesleaf.*

15. *Kinross-shire.*

16. *The District of Dumbartonshire west of the river Leven, comprehending the parishes of Arrochar, Luss, Roseneath, Row, Cardross, and that part of the parish of Bonhill on the right bank of the river Leven.*

For the best Bull, from two to seven years old, *bona fide* the property, and in possession, of any proprietor or tenant in *each* of the ten Districts, Nos. 1, 4, 5, 6, 7, 8, 9, 10, 14, and 15, as above described, kept on his farm within the District, from the 20th day of May preceding the day of competition—Ten Sovereigns.

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For the second best Bull, of the age above specified, *bona fide* the property, and in possession, of any proprietor or tenant in *each* of the said ten Districts, and kept on his farm, within the District, for the aforesaid period—Five Sovereigns.

For the best Bull, of the age above specified, *bona fide* the property, and in possession, of any tenant in *each* of the six Districts, Nos. 2, 3, 11, 12, 13, and 16, kept on his farm, within the District, from the 20th day of May preceding the competition—Ten Sovereigns.

For the second best Bull, of the same age, in *each* of the said six last mentioned Districts, the property, and in possession, of any tenant, and kept on his farm, within the District, for the foresaid period—Five Sovereigns.

For the best *two* Queys, of two years old, the property of, and bred by, any tenant in each of the sixteen Districts above mentioned (Shetland, No. 13, and Kinross, No. 15, excepted)—Five Sovereigns.

For the second best *two* Queys, of two years old, the property of, and bred by, any tenant in each of the sixteen Districts above mentioned (Shetland, No. 13, and Kinross, No. 15, excepted)—Three Sovereigns.

For the best Quey, of two years old, the property of, and bred by, any tenant in the Shetland District, No. 13.—Five Sovereigns.

For the second best Quey, of two years old, the property of, and bred by, any tenant in Shetland—Three Sovereigns.

For the best two Queys, of two years old, the property of, and bred by, any tenant, or by any proprietor of land under L. 300 of yearly rent or value, in the Kinross District, No. 15.—Five Sovereigns.

For the second best two Queys, of two years old, the property of, and bred by, any tenant, or by any proprietor, as aforesaid, in Kinross-shire—Three Sovereigns.

The premiums in the 1st District are limited to the Galloway polled breed of Cattle; in the 2d, 3d, 11th, and 12th Districts, to the West Highland Breed; and for *Bulls* shown in the 14th District, to the Short-horn Breed. The competition in the Districts Nos. 1. to 9, both inclusive, will take place in 1830. In Nos. 10. to 16, both inclusive, the competition under the system of alternate years having been held in 1829, the next competition for the Society's Premiums will take place in 1831. In the intermediate year,

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such premiums only as shall be given by the gentlemen of the respective Districts, or by local associations therein, are to be competed for.

The following Members of the Society (as Members only, or their Factors in their absence, can be named) are hereby appointed Judges for the nine Districts first above mentioned. In the last seven Districts the Judges were named in the advertisement of 1829.

For the First District.—The Earl of Galloway; Lord Viscount Gairlies; Sir William Maxwell, Bart. M. P.; Sir James Dalrymple Hay, Bart.; Sir David Maxwell, Bart.; Sir Andrew Agnew, Bart.; James Blair, Esq. of Penningham, M. P.; John Adair, Esq. of Genoch; Colonel Vans Agnew of Sheuchan; Forbes Hunter Blair, Esq. of Dunskey; Nicol Brown, Esq. of Waterhaughs; Edward Boyd, Esq. of Mertonhall; John Cathcart, Esq. of Genoch; William Hamilton, Esq. of Craichlaw; Hugh Hawthorn, Esq. of Castlewig; Vans Hathorn, Esq. of Garthland; Colonel M'Douall of Logan; Lieutenant-Colonel M'Douall, Stranraer; James Carrick Moore, Esq. of Corswall; Stair Stewart, Esq. of Physgill; Robert Macmillan, Esq. of Polbae; Alexander Macneill, Esq. Stranraer, and any other Members in the District; five to be a quorum.—Mr Cathcart of Genoch, Convener.

For the Second District.—The Duke of Hamilton; Captain Fullerton of Kilmichael; Robert Brown, Esq.; John Paterson, Esq.; and any other Members in the district; two a quorum.—The Duke of Hamilton, in his absence his Grace's Factor, Convener.

For the Third District.—The Earl of Breadalbane; Viscount Glenorchy; Lord John Campbell; General Campbell of Lochnell; General Campbell of Monzie; Duncan Campbell, Esq. of Barcaldine; Robert Campbell, Esq. of Ardchattan; Charles Campbell, Esq. of Combie; Donald Campbell, Esq. of Dunstaffnage; Robert Campbell, Esq. of Sonachan; Colin Campbell, Esq. of Ballyveolan; Captain Macdougall of Macdougall, R. N.; Dugald Macdougall, Esq. of Gallinich; Allan Macdougall, Esq. W. S.; and any other Members in the District; five a quorum.—Lochnell, in his absence Mr Macdougall of Gallinich, Convener.

For the Fourth District.—Lord Abercromby; Lord Moncreiff; the Hon. Colonel Abercromby; Count Flahault; Sir Gilbert Stirling, Bart.; Robert Bruce, Esq. of Kennet; Robert Clark, Esq. of Comrie; James Erskine, Esq. of Aberdona; Thomas Graham Stirling, Esq. of Airth;

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J. R. Johnston, Esq. of Alva; James Johnston, Esq. younger of ditto; Craufurd Tait, Esq. of Harviestoun; Alexander Macfarlane, Esq. of Thornhill; John Moubray, Esq. of Cambus; John Philp, Esq. at Dolls; and any other Members in the District; three a quorum.—Lord Abercromby, in his absence Mr Johnston of Alva, and Mr Bruce of Kennet, or either of them, to be Conveners.

For the Fifth District.—The Duke of Montrose; the Marquis of Graham; Sir Archibald Campbell, Bart.; R. C. Bontine, Esq. of Ardoch; John Cross Buchanan, Esq. of Auchintoshan: John Buchanan, Esq. of Carbeath; John Buchanan, Esq. of Ardoch; John Buchanan, Esq. younger of Ardoch; Archibald Buchanan, Esq. of Auchintorlie; P. Buchanan, Esq. of Auchmar; John Campbell, Esq. M. P.; J. C. Colquhoun, Esq. of Killermont; Samuel Cooper, Esq. of Ballindalloch; James Dennistoun, Esq. of Dennistoun: J. Dennistoun, Esq. younger of ditto; J. M. Gartshore, Esq. of Gartshore; W. Dunn, Esq. of Kilbowie; W. C. C. Graham, Esq. of Gartmore; John Graham, Esq. younger of Ballagan; General Graham Stirling of Duchray; J. R. Smollet, Esq. of Bonhill; George Buchanan, Esq. of Finnich-Malise; R. Macgown, Esq. of Mains: John MacAdam, Esq. of Blairover; John MacInnes, Esq. of Auchinreoch and Woodburn; Stewart Jolly, Esq.; and any other Members in the District; five a quorum.—The Duke of Montrose, in his absence his Grace's Factor, Convener.

For the Sixth District.—The Earl of Kintore; Viscount Arbuthnot; Colonel the Honourable H. Arbuthnot, M. P.; Sir Alexander Ramsay of Balmain, Bart.; Captain Ramsay, Balbegno Castle; Thomas Burnett, Esq. younger of Leys; R. Barclay Allardice, Esq. of Ury; General Burnett of Banchory Lodge; Alexander Crombie, Esq. of Phesdo; R. W. Duff, Esq. of Fetteresso; R. Duff, Esq. younger of ditto; George Douglas, Esq. Sheriff of the County; John Burnett, Esq. of Kemnay; Sir Alexander Keith, K. M.; George Robertson Scott, Esq. of Benholm; James Scott, Esq. of Brotherton; Major-General Straton of Kirkside; William Shand, Esq. of Arnhall; Henry Lumsden, Esq. of Tilwhilly; William Stewart, Esq. Sheriff-Clerk of the County; and any other Members in the District; three a quorum.—Lord Arbuthnot, in his absence Captain Ramsay, Convener.

For the Seventh District.—The Duke of Gordon; the Earl of Aboyne; the Earl of Fife; Sir Charles Forbes, Bart. M. P.; Colonel Sir Alexander Leith of Freefield; John Forbes, Esq. M. P.; Charles Forbes, Esq. of Asloun; George Forbes, Esq. of Auchnagathil; Major-General Forbes of Auchernach; Major Anderson of Candacraig; Ar-

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chibald Farquharson, Esq. of Finzean; the Rev. Dr Forbes of Bielack; Major Forbes of Inverernan; Charles Gordon, Esq. of Wardhouse; J. D. Gordon, Esq. younger of ditto; Henry Leith Lumsden, Esq. of Auchindoir; Benjamin Lumsden, Esq. of Kingsford; John Roy, Esq. Factor on the Estate of Invercauld; Mr Grassick, Glenbucket; Mr Stewart Skellater; Mr Grassick, Buchaam; and any other Members in the District; four a quorum.—John Forbes, Esq. M. P., in his absence, Dr Forbes of Bielack, Convener

For the Eighth District—The Earl of Aberdeen; Lord Saltoun; Sir John Steuart Forbes, Bart; Sir Charles Forbes, Bart. M. P; John Forbes, Esq. M. P.; Charles Forbes, Esq. of Asloun; George Forbes, Esq. of Auchnagathil; George Ferguson, Esq. of Pitfour; Michie Forbes, Esq. of Crimond; Colonel Gordon of Cluny, M. P.; T. A. Fraser of Lovat and Strichen; Garden Duff, Esq. of Hatton; James Ferguson, Esq. of Kinmundy; John Gordon, Esq. of Cairnbulg; Thomas Gordon, Esq. of Buthlaw; Alexander Forbes Irvine, Esq. of Chivas; J. W. Mackenzie, Esq. of Pitrichie; John Turner, Esq. of Turnerhall; Charles Bannerman, Esq. of Crimonmogate; Robert Hutchison, Esq. younger of Cairngall; Thomas Arbuthnot, Esq. of Meethall; Roderick Gray, Esq. Peterhead; and any other Members in the District; five a quorum. Lord Saltoun, in his absence Mr Ferguson of Kinmundy, to be Convener.

For the Ninth District—The Duke of Gordon; the Earl of Fife; Major Taylor, Rothiemay; General Hay of Rannes; Major Leith Hay, younger of Rannes; John Morrison, Esq. of Auchintoul, M. P.; Henry Leith Lumsden, Esq. of Auchindoir; Patrick Stewart, Esq. of Auchlunkart; Major Stewart, Pittyvaich; John Menzies, Esq. Gordon Castle; George Gordon, Esq. Factor for the Duke of Gordon; John Stronach, Esq. Factor for the Earl of Fife; and any Members in the District: three a quorum.—The Duke of Gordon, in his absence his Grace's Factor, to be Convener.

For the Tenth, Eleventh, Twelfth, Thirteenth, Fourteenth, Fifteenth, and Sixteenth Districts, the Judges and Conveners remain as intimated last year; with the addition of those resident Members who have been since elected.

RULES OF COMPETITION.

I. The Conveners, with the approbation of a quorum of the Judges for conducting the several competitions, are respectively authorised, in such cases as they shall see proper, to divide the two premiums allowed for bulls into three premiums, in such proportion as they shall approve, the first premium for bulls

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not being less than Eight Sovereigns: and, in like manner, to divide the sums allowed for queys into three premiums, fixing their amount. In Shetland, the Judges are empowered to divide the premiums for bulls into four, the first not being under Six Sovereigns; and for queys, also into four, the first not being under Three Sovereigns.

2. The Judges shall not place for competition any stock which, in their opinion, does not fall within the regulations prescribed, or does not possess merit; and, in no instance, shall any of the premiums be awarded where there are not, after such selection, at least three competitors; reserving to the Judges, in the case here provided for, to make such allowance to a party showing stock of merit, not exceeding half the amount of the premium, as, under the circumstances, they may think reasonable.

3. The times, and also the places of competition, are to be fixed by the Conveners, with the advice of at least a quorum of their respective Committees; and the competitions are to take place between the 20th July and the 1st day of November next.

4. The Convener of each Committee will give timely notice to the other Judges of the District, of the place and time of the competition; and will be particularly careful that the same be intimated at the several parish-church doors within the District for at *least two* successive Sundays previous to the competition.

5. As these premiums were given in some of the above mentioned Districts in 1827, 1828, and also 1829, it is to be observed that the Society does not admit an animal in any class of stock which may have gained a *first* premium at a District Show in a former year, to be again shown *in competition* in any District; and for no description of stock shall either the same or a lower denomination of premium be awarded in the District in which they have already gained such premium.

6. No Member of the Committee showing stock of his own at the competition shall act as Judge, nor shall Factors, when they are Members of the Society, and are named Judges, or when acting as such in the absence of proprietors, compete for premiums in the District in which they are Judges, in those Districts and classes in which proprietors are excluded from competition. In all cases it is expected that the bulls for which premiums are awarded, shall not be limited to serve the stock of the owner. The same person not to obtain more than one of the premiums for bulls, nor more than one of the premiums for queys in one year.

7. In order to entitle the competitors to their respective premiums, a regular report, signed by the Convener, and at least a majority of the Judges who attend the competition, must be transmitted by the Conveners, so as to be received by the Secretary on or before the 10th of December next, and which report must specify the ages of the Bulls and Queys preferred; the length of time the Bulls have been in the possession of the competitors; and, with respect to the Queys, that they were bred by the competitors, and were their property, on the day of competition; the number of Bulls and Queys respectively produced thereat; the number placed for competition; the names and designations of the persons to whom the premiums have been adjudged; amount of premiums voted to each; and, in general, that all the rules of competition fixed by the Society, as above mentioned, have been strictly observed; and, in particular, that the previous intimations to the Judges, and advertisements at church doors, were regularly made as required. In case all the Judges who may have attended shall not have subscribed the report, the Convener will mention the cause which may have prevented their doing so.

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Farther, it is to be distinctly understood, that in no instance does any claim lie against the Society for expenses attending a show of stock, beyond the amount of the premiums offered.

With reference to the competition in the 1st District, the report must specify that the Bulls and Queys preferred were of the Galloway breed; in the 2d, 3d, 11th, and 12th Districts, of the West Highland breed; and in the 14th District, that the Bulls were of the pure Short-horn breed.

Conveners are requested to get the reports drawn up, and signed by a majority of the Judges present at the competition, before they separate.

NOTE.—The Society, being impressed with the benefit to be derived from continuing these competitions in the same districts for a longer period than had formerly been the practice, proposes to offer them in the District No. 9. (in which the present is the first year's competition of the series), for the years 1832 and 1834; and, provided the gentlemen of the district, or any local association therein, shall continue the competition and award premiums in the district, to the amount of not less than one-half of the Society's premiums, and to the same description of stock, during the intermediate years 1831 and 1833, the Society will continue its premiums to the district in the year 1835. The same provisional continuance for the year 1832 was intimated in 1827, with reference to the Districts, Nos. 10, 11, 12, and 13, in which 1827 was the first year of competition; a similar intimation of provisional continuance for 1833 was made in 1828 for the Districts No. 1 to 8, both inclusive, in which 1828 was the first year of competition, and the like provisional intimation of continuance for 1834 was made last year for the Districts Nos. 14, 15, and 16, in which 1829 was the first year of competition. A certificate of the competition and premiums awarded at the two intermediate local shows signed by at least two members of the Society, must be transmitted to the Secretary of the Society, so as to be received by him on or before the 10th December in each year, in order to entitle the Districts to any claim for the fourth year's premiums.

II. SHEEP AND WOOL.

1. PREMIUMS FOR IMPROVING THE BREED OF SHEEP IN THE FOLLOWING DISTRICTS:—

1. *The Countries of Glengary, Abertarf, Stratharrick, and the parish of Urquhart in Inverness-shire, including the lands of Aberchalder and Dumnaglass, partly in Nairnshire.*

2. *The Isle of Skye, in Inverness-shire.*

3. *The District of Forfarshire called the Braes of Angus, comprehending the parishes of Glenisla, Lintrathon; that part of the parish of Kirriemuir designated Glenprosen; the united parishes of Cortachy and Clova, Glenmoy and Glenogle (being the pasture part of the parish of Tannadice); the parishes of Lochlee, Edzell, Lethnot, and Menmuir.*

4. *The District of Cowal, Argyllshire.*

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5. *The parishes in the Counties of Mid-Lothian, Selkirk, Roxburgh, Peebles, and Dumfries, as specified in the advertisement of last year.*

6. *The parishes of Assynt, Tongue, Duriness, and Edderachillies, including the Grazings of Invercashly and Shiness, in the County of Sutherland.*

7. *The parishes of Applecross, Lochcarron, Lochalsh, Kintail, Glenshiel, and Glenelg, in the Counties of Ross and Inverness.*

For the best Pen of fifteen Two-year-old Cheviot Ewes, the property of any tenant within the First District, and which shall be certified at the competition to have been at least one year in his possession—Eight Sovereigns.

For the second best Pen, certified as aforesaid—Four Sovereigns.

For the best Pen of fifteen Cheviot Gimmers, in the First District—Seven Sovereigns.

For the second best ditto—Four Sovereigns.

For the best Pen of eighteen Gimmers or Ewes of the Black-faced breed, from sixteen to twenty months old, the property of any tenant within the Second and Third Districts, and which shall be certified at the respective competitions to have been at least one year in his possession, and to have been, during that year, grazed on the same kind of pasture with the remainder of the flock of like age—Ten Sovereigns.

For the second best Pen, as aforesaid—Seven Sovereigns.

For the third best Pen as aforesaid—Three Sovereigns.

Premiums will be given by the Society in the 4th and 5th Districts in 1831, and also in 1832, to the amount, and for the same description of Stock, as in 1827 and 1829, provided the resident gentlemen or local associations shall award premiums in 1830. In the 6th District the premiums given in 1829 will be renewed in 1831 and 1833, and provisionally for an additional year, if they shall have been continued in the district during the intermediate years 1830 and 1832.

Premiums for Black-faced Sheep will be given by the Society in the 7th or Applecross and Lochalsh, &c. district in 1831, for the first year of the series.

The following Members of the Society are appointed Judges for awarding Sheep Premiums in the three first Districts:—

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For the First District.—Colonel the Hon. F. W. Grant, M. P.; J. M. Grant, Esq. of Glenmoriston; James Grant, Esq. of Corrymony; Patrick Grant, Esq. of Lakefield; Simon Fraser, Esq. of Foyers; A. T. F. Fraser, Esq. of Abertarff; J. B. Fraser, Esq.; J. L. Macgillvray, Esq. of Dumnaglass; Gordon Cameron, Esq. of Letterfinlay; James Grant, Esq. W. S.; and any other Members in the district: two a quorum.—Mr Grant of Glenmoriston, in his absence Mr Fraser of Abertarff, to be Convener.

For the Second District.—Lord Macdonald; the Right Hon. C. Grant, M. P.; J. N. Macleod, of Macleod, Esq. M. P.; A. K. Mackinnon, Esq. Corry; Alex. Macalister, Esq. of Strathaird; Captain Macaskill, Rudunan; Captain Macleod Gesto; Dr Farquhar Mackinnon; Neill Mackinnon, Esq.; the Rev. Mr Mackinnon, Slate: John Elder, Esq., Slate; H. P. Macdonald, Esq. of Mougstad; H. Macaskil, Esq., Tallisker; Donald Macleod, Esq., Claggan; Alexander Macleod, Esq. Factor for Lord Macdonald; Edward Gibbons, Esq. Factor for Macleod—five a quorum—Lord Macdonald and Mr Macleod of Macleod, and their Factors in their absence, Conveners.

For the Third District.—The Earl of Airlie; the Earl of Fife; the Hon. W. Maule of Panmure, M. P.; Colonel the Hon. D. Ogilvy of Clova; Capt. the Hon. W. Ogilvy, Airlie Castle; Sir James Ramsay, Bart. of Bamff; P. Wedderburn Ogilvy, Esq. of Ruthven; John Wedderburn, Esq.; Alex. Greenhill, Esq. of Fearn: James Carnegie Arbuthnot, Esq. of Balnamoon; George Lyon, Esq. of Glenogil; and William D. Proctor, Esq. of Halkerton:—three a quorum.—The Earl of Airlie to be Convener.

The Judges for the 4th, 5th, and 6th Districts, were intimated last year;—those for the 7th District will be named in the List of Premiums for 1831,—Sir Hugh Innes, Bart. and Thomas Mackenzie Esq. of Applecross to be Conveners in that District.

RULES OF COMPETITION.

The competition for the Premiums in the three first Districts will take place on such days, between the 20th of July and 1st November 1830, as shall be fixed by the Conveners, with the advice of a quorum of their respective Committees: and the Conveners of the second and third districts are hereby empowered, with the same advice, to fix the places of competition for these districts. The Judges, in deciding the premiums for Sheep, will have regard both to the wool and carcass of the animal. The regulations for Cattle Shows, in regard to fixing the competition—the previous intimations to Judges and Competitors—the placing of the stock, and the number of Competitors required for competition—the power to make provisionally an allowance for Stock of merit, in the event of deficiency in number—authority to divide the three Premiums in the second and third dis-

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tricts into four—the first Premium, in either, not being under eight Sovereigns—the rules as to awarding first and second Premiums, and prohibiting Members acting as Judges who are also Competitors; the regulations relating to extra expenses, and the manner in which the reports are to be certified and transmitted, are severally hereby declared to be applicable to the Premiums for Sheep.

The Sheep exhibited for the Premiums in the first district, must be certified to the satisfaction of the Judges of competition, to have been selected from hirsels consisting of at least fifty of the same kind and age; that such hirsel has not been, at any time, selected from the rest of the competitor's Stock, or reared from a hirsel of selected ewes; that the hirsel has not, at any time, been fed on turnips or other green crop, nor upon artificial grasses, nor differently treated from the whole stock of the respective ages belonging to the competitor, it being the object of the Society to award these Premiums for Cheviot Sheep, reared exclusively upon hill pastures.—Fort Augustus is fixed as the place of competition for the first district.

The *Note* annexed to the Rules of Competition for the Premiums for Cattle is applicable also to the Districts for Sheep, in which the Premiums will be continued by the Society for an additional period, on the conditions specified in the said note.

2 SPAYING SHEEP.

1. To the Owner of Sheep in the counties of Ross, Cromarty, or Inverness, who shall, at clipping time 1830, produce the greatest number of Ewes, not being less than 100, which, as lambs in spring 1828, have been subjected to the operation of spaying, and thereafter pastured in like manner as the other ewes of the same flock and age, until the period of competition—Twenty Sovereigns, or a piece of plate of that value.

2. To the Owner who shall produce the next greatest number as aforesaid, not less than fifty—Fifteen Sovereigns.

3. To the Owner who shall produce the third greatest number, not less than thirty—Ten Sovereigns.

As these Premiums have been offered in consequence of a request from the district, and with the view of ascertaining the advantages attending the practice, as a mode of management, on Store Farms, to a partial extent, an articulate report is wished of the various details specified in the Society's List of Premiums for 1828 and 1829. Reports accompanied by certificates by members of the Society, and the affidavits of the Competitors in relation to the details of management, to be lodged at the Society's Hall, on or before 10th December 1830.

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III.—WORK HORSES.

PREMIUMS FOR IMPROVING THE BREED OF DRAUGHT HORSES.

1. *The Eastern District of Fifeshire.*
2. *The County of Ayr.*

For the best Stallion, from three to twelve years old, for the improvement of the breed of Draught Horses, *bona fide* the property and in possession of any person within the East District of Fifeshire, kept for the use of the district, and shown within the same at such times and places as the Committee after named shall fix, from the 1st April to the 1st of August 1831—Ten Sovereigns.

For the best Mare for breeding Draught Horses, *bona fide* the property and in possession of any tenant in the said District, from 1st January 1831 to the day of competition—Eight Sovereigns.

For the best three year old Colt or Filly, *bona fide* the property of and bred by any tenant in said district—Five Sovereigns.

The Premiums for Horses in the second or Ayrshire District, which will probably be somewhat varied from those heretofore offered at District shows, will be matured in due time for publication with the list of 1831; when the Committee for regulating the Competition will also be named.

RULES OF COMPETITION.

The times and places where the Stallions are to be exhibited for the use of and within the Districts, and also the time and place of competition for the Premiums, are to be fixed by the Conveners, with the concurrence of at least a quorum of the respective Committees, and are to be published by the Convener at the church doors in due time, or in such other manner as shall be thought by him and a quorum of the Committee effectual for the information of those interested.

The Competition to take place betwixt 1st April and 1st August. The regulations for Cattle Shows in regard to fixing the competition—the previous intimations to judges and competitors—the power of the judges to withhold the premiums if the animals produced shall be of inferior merit—those relating to extra expenses—and against competitors being also judges—and the manner in which the reports are to be certified and transmitted, are severally hereby declared applicable to the premiums for Horses.

The following Members of the Society are appointed a Committee for regulating every thing relative to the competition in the first District, and judging thereat, viz.

The Earl of Leven and Melville; the Earl of Rosslyn; Sir John Oswald of Dunnikier, Bart.; J. Balfour, Esq. of Fernie; John Boswell, Esq. of Balmuto; Major J. Falconer Briggs of Strathairley; William Berry, Esq, of Tayfield; General Durham of Largo; R Ferguson.

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Esq. of Raith; James Heriot, Esq of Ramornie; Charles Kinnear, Esq. of Kinnear; J. W. Melville, Esq. of Mount-Melville; D. Maitland Makgill, Esq. of Rankeillour; J Home Rigg, Esq. of Morton and Downfield; Colonel Oswald; Archibald J. Stewart, Esq. St. Fort; Andrew Thomson, Esq. of Kinloch; Capt. Wemyss of Wemyss, M. P.; H. Wedderburn, Esq. of Wedderburn; and any other members in the district.—The Earl of Leven, in his absence Major Briggs of Strathairly, Convener.

IV. SWINE.

District.—*The Parishes of Greenock, Port-Glasgow, Kilmalcolm, Largs, and Innerkip, in the Counties of Renfrew and Ayr.*

For the best Boar, not under twelve months, nor more than four years old, *bona fide* the property and in possession of any person in the district in autumn 1830, and exhibited at a competition to be held at Greenock, at such times as the Committee after named shall fix—Seven Sovereigns.

For the second best ditto—Three Sovereigns.

For the best breeding Sow of the same age, and on the same conditions—Four Sovereigns.

For the second best ditto—Two Sovereigns.

The following Members of the Society are named a Committee for managing all details and fixing the necessary regulations for the competition, viz—

The Earl of Glasgow; Lieutenant-General Sir Thomas Brisbane, Bart.; Sir Michael Shaw Stewart, Bart. M. P.; Lieutenant General Darrock, of Gourock; J. C. Dunlop, Esq. Sheriff of Renfrewshire; R. Wallace, Esq. of Kelly; R. Cunninghame Bontine, Esq. of Ardoch; James Hunter, Esq. of Halfton; Claud Marshall, Esq. Sheriff-Substitute at Greenock; John Campbell, Esq. of Craignure; William MacFie, Esq. of Langhouse; John Scott, Esq. of Hawkhill; John Scott, Esq. younger of do.; Roger Ayton, Esq. banker, Greenock; W. Macknight Crawford, Esq. of Cartsburn; Alexander Thomson, Esq. banker Greenock; James Watt, Esq. of Crawfordsdyke; James Stewart, Esq. William Johnstone, Esq.; Robert Ewing, Esq.; Robert Sinclair, Esq.; James Mure, Esq.; Andrew Mure, Esq. all merchants in Greenock; and any other Members in the District: five a quorum.—Mr Wallace of Kelly, in his absence Mr Marshall, to be Convener.

A Report of the award of the Premiums, with a copy of the Regulations of Competition, to be transmitted to the Secretary by 10th December next.

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CLASS VI.

PRODUCTS OF LIVE STOCK.

1. BEST MANAGED DAIRY IN THE COUNTY OF LANARK.

To the Tenant in the county of Lanark who shall have kept the best managed Dairy, of not fewer than ten Cows, from 20th April 1829, to 20th April 1830—Thirty Sovereigns, or a Piece of Plate of that value.

To the Tenant who shall have kept the next best managed Dairy, as aforesaid—Twenty Sovereigns, or Plate of that value.

Reports, comprehending a distinct statement of all the particulars required by the detailed conditions of competition, specified in the Society's List of Premiums for 1829, and duly verified by affidavit, and certified by Norman Lockhart, Esq. the Convener, to be lodged with the Secretary, at the Society's Hall, on or before the 1st of June next 1830.

2. CURING BUTTER.

DISTRICT—*The Parishes of Kirkmichael, Inveravon, Aberlour, Mortlach, Botriphnie, and Boharm, in Banffshire, and of Rothes and Knockando, in Elginshire.*

The Premiums given, and regulations established in the county of Aberdeen, for promoting an improved system of Curing Butter, having been productive of the best results, the following Premiums are offered in the district above described.

To the Tenant who shall make and cure the best quality of butter for the market, not being less than eighteen imperial stones, being equal to ten and a half stones Banffshire weight, during the season 1830—Eight Sovereigns.

For the second greatest quantity, as aforesaid—Five Sovereigns.

For the third greatest quantity, as aforesaid—Four Sovereigns.

For the fourth greatest quantity, as aforesaid—Three Sovereigns.

CONDITIONS.

The Butter must be certified on oath to have been made and cured on the competitor's farm, during the season 1830; the quantities are to be stated in imperial stones of 14 lb. avoirdupois; and the affidavit must bear that the sample of one or more kits produced is a fair average of the

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quantity made and cured as aforesaid. It shall be inspected by a Committee of the Members of the Society resident within the district, at a meeting to be called by the Conveners for that purpose, at Charlestown of Aberlour, on such day as the Conveners may appoint. A Report of the award of the Premiums to be lodged with the Secretary of the Society, on or before 10th December 1830. G. Macpherson Grant, Esq. of Ballindalloch; in his absence R. Wharton Duff, Esq. of Orton, and P. Stewart, Esq. of Auchlunkart. to be Convener.

The Convener has undertaken, on application to him, to furnish intending Competitors with a copy of Observations on Making, Curing, and Casking of Butter, prepared originally by the Agricultural Association of Aberdeenshire.

CLASS VII.

COTTAGES.

1. PREMIUMS IN MONEY TO COTTAGERS FOR THE CLEANLIEST KEPT COTTAGES.

DISTRICTS.

1. *The County of Inverness.*
2. *The Stewartry of Kirkcudbright.*
3. *The Counties of Moray and Nairn.*
4. *The County of Wigton.*

In order to excite the attention of cottagers to keeping their cottages neat and clean, Ten Premiums of Two Sovereigns each, will be awarded to *Ten* Cottagers in *each* of the above districts, paying L. 5 of rent or under—or whose cottage and land annexed to it does not exceed that annual value—who shall be certified by two members of the Society, resident in the district, or by one member of the Society and the clergyman of the parish, to have been distinguished for the general neatness and cleanliness of the interior as well as exterior of his or her cottage (including the garden, should there be one attached to it), and to be *deserving*, on that account, of this mark of the Society's approbation.

CONDITIONS.

The certificate must bear that the cottage has been personally inspected by the parties granting it, and must give some description of the merits of the cottager, in respect of the manner in which the cottage as well as the immediately adjoining space have been kept, specifying, at the same time

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the name, designation, and residence of the competitor. For the First and Second Districts, the certificates must be transmitted to the Secretary of the Society on or before the 10th of November 1830, and for the Third and Fourth, on or before the 10th November 1831.

Should there be more than ten competitors in each District, the Society will be influenced by the circumstances of the case in deciding what claims are to be preferred: but, in every case, their decision will have regard exclusively to the neatness and cleanness with which the cottage and immediately adjoining space, have been kept, and not to the construction of the cottage, or to the materials of which it is composed.

2. COTTAGE MEDALS.

In the view of giving still farther encouragement to Cottagers of the above description, who do not reside in the counties in which the regular premiums are in operation at the time, and, at the same time, of giving aid to local associations and public spirited individuals, establishing or continuing, at their own expense, premiums for the like object, the Society have assigned six Cottage Medals annually to such associations or public spirited individuals as apply for the same, and may be desirous to add that testimony of approbation to such premiums as they themselves bestow. Applications for these medals must be accompanied by a report, certified in the terms required by the preceding conditions, describing the merits of the cottager, and the nature of the encouragement which has been afforded by the parties applying.

3. PREMIUMS TO COTTAGERS FOR PROMOTING ATTENTION TO THE CULTIVATION AND MANAGEMENT OF BEES.

DISTRICTS.

1. *The Counties of Dumbarton, Argyll, and Bute.*
2. *The Counties of Banff, Moray and Nairn.*

To the Cottager in the first District, paying L. 5 of rent or under, or whose cottage and land annexed to it does not exceed that annual value, who, between 1st of June and 1st of October 1830, shall have raised the greatest number of Hives of Bees, not fewer than seven, from stocks his or her own property, none of the hives weighing under 20 lb., exclusive of the weight of the material of the hive or skep—A premium of Five Sovereigns.

To the Cottager in the same District who shall have raised the second greatest number, as aforesaid—Three Sovereigns.

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To the Cottager in the same District who shall have raised the third greatest number, as aforesaid—Two Sovereigns.

Certificates of the number of Hives, and their several weights, making allowance for the weight of the skeps (which are to be weighed before being used), signed by two Members of the Society, resident in the neighbourhood, or by one member and the clergyman of the parish, to be transmitted to the Secretary on or before 10th November 1830.

Similar Premiums will be given in the Second Districts for Hives raised between the 1st June and 1st October 1831.

CLASS VIII.

WOODS AND PLANTATIONS.

1. HONORARY PREMIUM FOR PLANTING.

To the Proprietor who shall communicate to the Society, on or before the 10th of November in any year, a satisfactory Report on the Planting of Land, founded on experiment; and who shall accordingly have planted on his own property an extent of not less than one hundred and fifty acres, within a period of five years preceding the date of his Report—The Gold Medal.

It is required that the report shall relate more especially to the tract of land which forms the subject of the communication, detailing the necessary particulars regarding its soil, climate, and exposure; the kinds, age, and number of the plants used; the mode of planting adopted, and the expenses of the work; and the writer is invited to state those more general observations, on the principles and practice of planting, which his knowledge and experience on the subject may enable him to communicate.]

2. RAISING THE PINUS SYLVESTRIS FROM NATIVE SEED.

To the Nurseryman, or other person in Scotland, who shall, between the 30th October 1830 and 30th October 1833, have raised on rather poor nursery-ground, and sold for planting, the greatest number of plants, not fewer than three millions, of the *Pinus Sylvestris*, from seed imported from Norway, and taken off healthy trees in that country, or taken off healthy and free growing trees of the natural grown pine in the Highland districts of the counties of Aberdeen, Moray and Inverness—Fifteen Sovereigns, or a Piece of Plate of that value.

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Competitors to transmit to the Secretary of the Society, on or before 10th November 1833, affidavits in support of the collection of the seed, specifying the quantity, and the district in which it was collected, with certificates, signed by two members of the Society, specifying the soil and thriving state of the plants in the nursery-ground, and an affidavit of the number of plants sold to be planted out for timber, and to whom they are disposed of. Competitors are requested to attend to a paper on the *varieties* of *Pinus Sylvestris*, by the late Mr Don of Forfar, published in the Memoirs of the Caledonian Horticultural Society, vol. i. p. 121.

3. RAISING LARCH FROM NATIVE SEED.

To the Nurseryman, or other person in Scotland, who shall, between 30th October 1830 and 30th October 1833, have raised and sold for planting the greatest number of plants, not being fewer than one million, of the *Pinus Larix*, or Larch Fir, from seed imported from the Tyrol, or other regions of the Alps, to which it is indigenous, and taken off healthy trees in that country—Thirty Sovereigns, or a Piece of Plate of that value.

Certificates, similar to those for the *Pinus Sylvestris* to be transmitted on or before the 10th November 1833.

CLASS IX.

IMPLEMENTS OF HUSBANDRY AND USEFUL MACHINES.

To the person who shall invent or improve any Instrument or Machine applicable to Husbandry or Rural Economy, and which, from its utility in saving labour or expense, simplicity or cheapness of construction, or other circumstances, shall be deemed by the Society deserving of public notice—The Silver Medal, or such sum in money as the communication shall appear to deserve.

The account of the implement must be accompanied by a model made according to a definite scale, to be deposited in the Society's museum. The model to be of sufficient dimensions, formed of wood or metal, and the notice or description transmitted with it must specify, according to the best of the Inventor's abilities, the purpose for which his invention or improvement is designed.

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CLASS X.

GENERAL SHOW OF LIVE STOCK,

AND

AGRICULTURAL MEETING AT DUMFRIES IN 1830.

The Society having resolved to continue a General Show of Live Stock, Exhibition of Implements, and Roots and Seeds for Agricultural Purposes, and having fixed the Meeting to be held at Dumfries in the present year, the following Premiums are offered to be then awarded by the Society, aided by liberal votes from the Counties of Dumfries, Kirkcudbright, and Wigton, from the Town of Dumfries, and from the Nithsdale Agricultural Society. The Stock to be shown must have been reared and fed by Proprietors or tenants in Scotland, (under the exception of certain classes of breeding and extra stock, as specified in Article 6th of the Regulations); and all Stock to be shewn for the Premiums, must have been *bona fide* the property, and in possession of the exhibitor, from 1st January 1830.

CATTLE.

GALLOWAY BREED.

CLASS I. For the best Bull, of the Galloway breed, not under two, nor exceeding six years old—Fifteen Sovereigns, or Plate of that value.

For the second best ditto—Seven Sovereigns.

II. For the best two Oxen, of the Galloway breed, not under three years old, showing most symmetry, fat, and weight—Ten Sovereigns, or Plate of that value.

III. For the best two spayed Heifers, of the Galloway breed, not under three years old, showing most symmetry, fat, and weight—Ten Sovereigns, or Plate of that value.

IV. For the best breeding Cow, of the Galloway breed, not under three years old—Ten Sovereigns.

For the second best ditto—Five Sovereigns.

V. For the best two Queys, of the Galloway breed, not exceeding thirty-three months old—Ten Sovereigns.

For the second best two ditto—Five Sovereigns.

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VI. For the best lot of Stirks, of the Galloway breed, not exceeding twenty-one months old, and not under one half of those bred on the farm, nor fewer than five in number—Ten Sovereigns.

Note.—In Class I. IV. V. and VI. regard to be had to symmetry and size only.

AYRSHIRE BREED.

VII. For the best Bull, of the Ayrshire breed, not under two, and not exceeding six years old—Ten Sovereigns, or Plate of that value.

VIII. For the best Milch Cow, of the Ayrshire breed, not under three years old—Ten Sovereigns.

IX. For the best two Queys, of the Ayrshire breed, not exceeding thirty-three months old—Five Sovereigns.

WEST HIGHLAND BREED.

X. For the best Ox, of the West Highland breed, not under three years old, showing most symmetry, fat, and weight—Ten Sovereigns, or Plate of that value.

For the second best ditto—Five Sovereigns.

SHORT-HORN BREED.

XI. For the best Ox, of the pure short-horn breed, showing most symmetry, fat, and weight—Ten Sovereigns, or Plate of that value.

ANY BREED.

XII. For the best Ox, of any breed, pure or cross, the particulars of the breed and age being specified—Ten Sovereigns.

SHEEP.

LEICESTER BREED.

XIII. For the best Tup of the Leicester breed, not under twenty nor exceeding forty-eight months old—Ten Sovereigns.

XIV. For the best Pen of three Ewes, of the Leicester breed, not exceeding four years old—Five Sovereigns.

XV. For the best Pen of three fat Wedders, of the Leicester breed, not exceeding three years old—Five Sovereigns.

CHEVIOT BREED.

XVI. For the best three Tups, of the Cheviot breed, not exceeding forty-three months old—Ten Sovereigns.

For the second best three ditto—Five Sovereigns.

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XVII. For the best Pen of ten Ewes, of the Cheviot breed, not exceeding six years old, selected from a regular breeding stock of not less than 200 rearing lambs of that season till the middle of July, and being kept with the rest of the stock till, at least, the Whitsunday preceding—Ten Sovereigns.

For the second best Pen ditto—Five Sovereigns.

XVIII. For the best Pen of five fat Wedders, of the Cheviot breed, not exceeding five years old—Five Sovereigns.

Note—In Classes XVI and XVII, regard to be had to the wool, as well as to the symmetry and weight of the carcass.

BLACK-FACED BREED.

XIX. For the best three Tups of the black-faced breed, not exceeding forty-three months old—Ten Sovereigns.

XX. For the best Pen of ten Black-faced Ewes, not exceeding six years old—Ten Sovereigns.

For the second best Pen ditto—Five Sovereigns.

XXI. For the best Pen of five fat Wedders, of the Black-faced breed, not exceeding five years old—Five Sovereigns.

CROSS-BREED.

XXII. For the best Pen of three fat Wedders, of any cross, the particular cross being specified, not exceeding forty-eight months old—Five Sovereigns.

PIGS.

XXIII. For the best Boar, not under twelve months, not exceeding four years old—Eight Sovereigns.

For the second best ditto—Five Sovereigns.

XXIV. For the best breeding Sow, not under twelve months, and not exceeding four years old—Six Sovereigns.

For the second best ditto—Four Sovereigns.

XXV. For the best two Pigs, not exceeding forty weeks old—Five Sovereigns.

Note—The award of the premiums in these three classes to be with reference to the production of Bacon.

HORSES.

XXVI. For the best Stallion, from three to twelve years old, for the improvement of the breed of Draught Horses—Ten Sovereigns, or Plate of that value.

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XXVII. For the best Stallion, from three to twelve years old, for breeding horses for coach or chariot—Ten Sovereigns, or Plate of that value.

Note.—It is required that the Stallions produced in competition for the Premiums in these two Classes shall have served in the district for the season preceding the day of competition.

XXVIII. For the best Mare, not exceeding twelve years old, for breeding draught horses, and which shall have been at least one year in the possession of the competitor—Ten Sovereigns.

XXIX. For the best Mare, not exceeding twelve years old, for breeding Horses for coach or chariot, and which shall have been at least one year in the possession of the competitor—Ten Sovereigns.

XXX. For the best three-year old Draught Gelding or Filly—Five Sovereigns.

EXTRA STOCK, IMPLEMENTS, ROOTS, AND SEEDS.

For Extra Stock of any kind, not shown for any of the above Premiums, and not exceeding in one lot, five Cattle, or ten Sheep, and for Implements of Husbandry, Roots and Seeds,—honorary Medals or Premiums will be awarded, to the value in whole of Eighty Sovereigns.

SWEEPSTAKES PROPOSED,

ONE GUINEA EACH.

To close and name to the County-Clerks of the counties of Dumfries, Wigton, and Kirkcudbright; to the Town-Clerks of Dumfries; or to the Secretary of the Society in Edinburgh, before the 1st of September.

Stock to be entered for the premiums may also be entered for the stakes.

1. For the best Galloway Bull, two years old and upwards.
2. For the best Galloway Bullock.
3. For the best Spayed Heifer of the Galloway breed.
4. For the best Galloway Quey.
5. For the best Ox of the Ayrshire breed.
6. For the best Ayrshire Milch Cow, not under four years old.

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7. For the best Draught Stallion, two years old and upwards.

8. For the best Draught Mare.

9. For the best Brood Mare fitted for Road or Field.

10. For the best Colt, under four years old, fitted for Road or Field.

11. For the best Boar.

12. For the best Brood Sow.

13. For the best three Black-faced Wedders.

14. For the best three Cheviot ditto.

15. For the best Southdown Tup, not under twenty, and not exceeding sixty months old.

16. For the best pen of three Southdown Ewes, not exceeding four years old.

17. For the greatest Variety and best Quality of Stock, *bona fide* fed and exhibited by any one competitor.

GENERAL REGULATIONS FOR THE SHOW.

1. The Competition will take place at Dumfries on Tuesday the 21st September next.

2. The name, residence, and post-town of the Exhibitor, the name of the Breed, the number of the Class in which the Animals are to be exhibited, their age, and, in the case of Fat Stock, the kind of food upon which they have been fed, must be regularly certified, and the Certificate, signed by the Exhibitor, agreeably to the form annexed, must be duly lodged as required by Article 3d.—The name and residence of the Breeder, and the Pedigree of the Stock, as far as known, must also be given.

3. The certificates must be lodged with the Secretary before twelve o'clock on Wednesday the 15th September, at which time a list will be made up by him; and no stock will be allowed to enter into competition, or to be shown, which is not included in that list. *Printed forms* of certificates may be had on application at the Society's Hall, No. 6. Albyn Place, Edinburgh, or at the office of any of the County Clerks connected with the Show, and the Town-Clerks of Dumfries. On or before Tuesday the 14th September, the Secretary will be at Dumfries, to answer inquiries, attend to details, and to receive certificates. In the mean time, certificates may be lodged with him at Edinburgh, or at Dumfries, with the County or Town Clerks there.

4. A responsible person, on the part of the Exhibitor, must attend when the certificates are lodged, to give explanation, if it should be necessary, and receive instructions as to matters of detail at the Exhibition. The person or persons so attending must be acquainted with the various parti-

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culars required to be certified regarding the Stock of which they are in charge, more especially the mode of feeding in the case of Fat Stock; and it shall be competent to the Committee to require the Exhibitor, or the person in charge of the Stock, to confirm the certificates upon oath on the day of Competition, in such cases as they think necessary.

5. A ticket or order will be delivered by the Secretary to the person in charge of each lot, for its being received into the Show Yard; and no Stock whatever can come within the premises without such warrant. One servant only for each lot can be admitted, and who must afterwards continue in charge of that lot in the Show Yard. Bulls must be secured by a ring or screw in the nose, with a chain or rope attached, otherwise they cannot be admitted into the Show Yard.

6. The Stock exhibited for the Premiums must have been the property, and in the possession of the competitors, from 1st January 1830, and must have been fed solely on farm produce, excluding distillery wash and grains. Stallions, Leicester Tups and Boars, may be shewn for the Premiums,—and Extra Stock of these descriptions, and Short-horn Bulls, may be exhibited for honorary notice, although not bred in Scotland; but it is required that Males of Breeding Stock, in the *competing classes*, shall not only have been in possession of the competitors for the period required, but must have served, or be retained to serve, in Scotland, at least one season.

7. The distance each Ox travels to the Show, and the date of being put to fatten, to be mentioned.

8. A competitor may show more than one lot in any class, but shall not gain more than one Premium for Stock in the same class. It shall not be competent to enter a lot in one class, and afterwards to withdraw it for competition in another class, unless by directions of the Committee. An animal having already gained the first premium in his class, at any of the Society's General Shows of Stock, which have been held at Edinburgh, Glasgow, or Perth, is not to be shown again in competition in the same class, but may be exhibited as Extra Stock, or entered for Sweepstakes.

9. Gentlemen intending to exhibit Extra Stock, must intimate to the Secretary, and describe the Stock to be shown six days before the competition. Sweepstakes to be reported in due time, in order that proper Judges may be appointed, and other necessary arrangements made.

10. The Stock exhibited will not be distinguished in the Show Yard by the name of the breeder, feeder, or owner (until after the premiums are decided) but by *Tickets* or *Numbers* to be affixed to each lot, corresponding to the list to be made up by the Secretary.

11. The Committee of the Society appointed to conduct the arrangements for the Show, will appoint skilful persons to act as Judges for the several classes, and to report to the Committee the lots which, in their opinion, are entitled to premiums. In forming their opinion, the Judges

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will have regard to the instructions to be delivered for their guidance, and particularly to symmetry, size, early maturity, purity, and general qualities characteristic of the different breeds they have to judge of, making due allowance for age, feeding, and circumstances peculiar to the cases which come before them.

12. The Committee of the Society, and the Judges to be named by them, will begin to view the Stock on the 21st September, at ten o'clock A. M. precisely; and the usual time will be allowed to the Judges for examining the Stock, and forming their opinion, before the admission of any person except a servant in charge of each lot. To prevent confusion, the different lots must be brought to the ground *at or before eight o'clock* in the morning.

13. On their arrival at the gate, instructions will be given as to the particular part of the Show Yard to be occupied by each class. The Stock will be withdrawn, and the Show Yard shut at four o'clock.

14. Persons intending to exhibit Implements, Roots, or Seeds, must communicate with the Secretary, and lodge with him a memorandum descriptive of the articles to be shown, at least five days before the Meeting.

Finally, No change can, under any circumstances, be made upon the General Regulations established by the Society for Agricultural Meetings and General Shows of Live Stock, unless regularly submitted and approved of at a meeting of the Directors in Edinburgh, and duly intimated to Competitors.

His Grace the Duke of Hamilton and Brandon, President; his Grace the Duke of Buccleuch, Vice-President; the Right Honourable the Lords Lieutenants, Vice-Lieutenants, and Conveners of the three Counties of Dumfries, Kirkcudbright, and Wigton, with fifteen Members to be named by each of these Counties, at their General Meetings in April, assisted by the County Clerks and Town Clerks of Dumfries, and by the Secretaries of the Local Agricultural Associations, have been appointed a Committee for regulating all details connected with the Agricultural Meeting and General Show of Live Stock at Dumfries.—J. J. Hope Johnstone, Esq. of Annandale, one of the Extraordinary Directors of the Society, Convener.

A Deputation of the Directors of the Society will be at Dumfries two days before the Meeting.

FORM OF CERTIFICATE ABOVE REFERRED TO AS APPLICABLE TO FAT OXEN.

I near in the county of , do certify, That my Ox (or Oxen, as the case may be), of the breed, to be shewn at the General Show of Live Stock at Dumfries for the Premium in Class , was bred by Mr of ;—he is now years

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and months old, and was fed by me on , and has not, at any time, been fed on distillery wash or grains. He will have to travel miles or thereby, from the place of feeding to the Show at Dumfries. He was first put up to fatten on or about the day of

Witness my hand this day of 1830.

Signature of the Exhibitor.

Any observations as to the animals' appearance, and state of flesh when put up to feed, or other particulars which the Exhibitor may think material, and more especially the pedigree of the cattle, may be subjoined to the above certificate. The certificates for Breeding Stock, and for Horses, Sheep, and Pigs, will be varied in conformity to the Regulations applicable to these descriptions of Stock.

If the lot has not been bred by the Exhibitor, it is particularly requested that the Breeder, if known, may be mentioned.

CLASS XI.

GENERAL SHOW OF LIVE STOCK

AT

INVERNESS, IN 1831.

THE SOCIETY having resolved to hold the General Show of Live Stock for 1831 at Inverness, the following Premiums are offered to be then awarded by the Society, aided by liberal donations from the Counties more immediately connected with the Show, from the Town of Inverness, from local Agricultural Associations, and from individual Members. The Stock to be shown must have been reared and fed by Proprietors, or tenants in Scotland, and *bona fide* the property of the exhibitors.

CATTLE.

HIGHLAND BREED.

I. For the best Bull, not under three, nor exceeding six years old—Fifteen Sovereigns, or Plate of that value.

For the second best ditto—Seven Sovereigns.

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II. For the best breeding Cow, not under four, and not exceeding six years old—Ten Sovereigns, or Plate of that value.

III. For the best two Heifers, not under thirty-six, and not exceeding forty-five months old—Ten Sovereigns, or Plate of that value.

IV. For the best two Heifers, not under twenty-four, and not exceeding thirty-three months old—Seven Sovereigns, or Plate of that value.

V. For the best two Oxen, not under five, and not exceeding six years old—Ten Sovereigns, or Plate of that value.

VI For the best two Oxen, not under twenty-four, and not exceeding thirty-three months old—Seven Sovereigns, or Plate of that value.

VII. For the best two Oxen, of the pure Highland breed, which have never been housed, not exceeding sixty-five months old—Ten Sovereigns, or Plate of that value.

VIII. For the best lot of Stirks, not fewer than six, and not exceeding twenty-one months old—Seven Sovereigns, or Plate of that value.

SHORT-HORN BREED.

IX. For the best Bull, of the pure Short-horn breed, not under four, and not exceeding seven years old—Fifteen Sovereigns, or Plate of that value.

X. For the best Cow, of the same breed, not under four, and not exceeding eight years old—Ten Sovereigns, or Plate of that value.

XI. For the best Ox, of the same breed, not exceeding five years old—Ten Sovereigns, or Plate of that value.

XII. For the best two Heifers, of the pure Short-horn breed, not exceeding thirty-three months old—Seven Sovereigns, or Plate of that value.

ABERDEENSHIRE HORNED BREED.

XIII. For the best Bull, not under three, nor exceeding six years old—Ten Sovereigns, or Plate of that value.

XIV. For the best Cow, of the same breed, not under three, nor exceeding seven years old—Ten Sovereigns, or Plate of that value.

XV. For the best Heifer, not exceeding forty-five months old—Five Sovereigns, or Plate of that value.

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XVI. For the best Ox, not exceeding five years old—Five Sovereigns.

ABERDEENSHIRE POLLED BREED.

XVII. For the best Bull, not under three, and not exceeding six, years old—Ten Sovereigns, or Plate of that value.

XVIII. For the best Cow of the same breed, not under three, and not exceeding seven, years old—Ten Sovereigns.

XIX. For the best Heifer, not exceeding forty-five months old—Five Sovereigns.

XX. For the best Ox, not exceeding five years old—Five Sovereigns.

GALLOWAY BREED.

XXI. For the best Bull, not under three, nor exceeding six years old—Ten Sovereigns, or Plate of that value.

XXII. For the best Cow, of the same breed, not under three, nor exceeding seven years old—Ten Sovereigns, or Plate of that value.

XXIII. For the best Heifer, not exceeding forty-five months old—Five Sovereigns.

XXIV. For the best Ox, not exceeding five years old—Five Sovereigns.

ANY BREED.

Not being of the kinds above denominated.

XXV. For the best Bull, not under three, and not exceeding six, years old—Ten Sovereigns, or Plate of that value.

XXVI. For the best breeding Cow, not under four, and not exceeding six, years old—Ten Sovereigns, or Plate of that Value.

XXVII. For the best Heifer, not exceeding forty-five months old—Five Sovereigns.

XXVIII. For the best Ox, not exceeding five years old—Five Sovereigns.

CROSSES.

XXIX. For the best Ox, of any breed, crossed with the Shorthorn, shewing most symmetry, fat and weight—Five Sovereigns.

XXX. For the best Ox, of any breed crossed with the Highland, showing most symmetry, fat, and weight—Five Sovereigns.

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XXXI. For the best Ox, crossed of any other breeds—Five Sovereigns.

For the Second best ditto—Three Sovereigns.

For the Third best ditto—Two Sovereigns.

SHEEP.

BLACK-FACED BREED.

XXXII. For the best two Tups, not exceeding forty-five months old—Five Sovereigns.

XXXIII. For the best pen of five Ewes, not exceeding five years old—Five Sovereigns.

XXXIV. For the best Pen of five Gimmers—Five Sovereigns.

XXXV. For the best Pen of three Wedders, not more than four years old—Five Sovereigns.

XXXVI. For the best pen of three Wedders of any age, showing most symmetry, fat, and weight—Five Sovereigns.

XXXVII. For the best Pen of five Dinmonts—Five Sovereigns.

XXXVIII. For the best Pen of five Tup Lambs—Five Sovereigns.

XXXIX. For the best Pen of five Ewe Lambs—Five Sovereigns.

WHITE-FACED BREED.

XL. For the best two Tups of the indigenous White-faced breed of Scotland—Five Sovereigns.

XLI. For the best Pen of five Ewes of the same breed—Five Sovereigns.

CHEVIOT BREED.

XLII. For the best two Tups, not exceeding forty-five months old—Five Sovereigns.

XLIII. For the best pen of five Ewes, not exceeding five years old—Five Sovereigns.

XLIV. For the best Pen of five Gimmers—Five Sovereigns.

XLV. For the best Pen of three Wedders, not under thirty-six months, and not exceeding four years old—Five Sovereigns.

XLVI. For the best Pen of three Wedders, not under twenty-four, and not exceeding thirty-three months old—Five Sovereigns.

XLVII. For the best pen of three Wedders of any age, showing most symmetry, fat, and weight—Five Sovereigns.

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LEICESTER SHEEP.

XLVIII. For the best Tup, not under two years old—Five Sovereigns.

XLIX. For the best two Ewes, not exceeding four years old—Five Sovereigns.

CROSS BREED.

L. For the best Pen of three Wedders, a cross between the Black-faced and Cheviot breeds, and showing most symmetry, fat, and weight—Five Sovereigns.

LI. For the best five Dinmonts of a cross between these breeds—Five Sovereigns.

PIGS.

LII. For the best Boar—Five Sovereigns.

LIII. For the best Sow—Five Sovereigns.

LIV. For the best three Pigs, not exceeding forty weeks old, and of a breed esteemed to be most profitable for the purpose of rearing and feeding for curing—Three Sovereigns.

HORSES.

LV. For the best entire Horse for Agricultural purposes, which shall have served Mares in a district north of the Spey, for the seasons 1830 and 1831—Twenty Sovereigns, or Plate to that amount.

LVI. For the best Breeding Mare for Agricultural purposes, having had at least one foal, and not being under six, nor exceeding twelve years old—Ten Sovereigns.

LVII. For the best three years old Filly, for Agricultural purposes—Five Sovereigns.

LVIII. For the best two years old ditto—Five Sovereigns.

LIX. For the best entire Horse, not exceeding 14 hands 3 inches high, for the purpose of breeding a stout, punch, active description of horse, of easy keep, and adapted for agricultural purposes in a Highland district—Ten Sovereigns, or Plate of that value.

LX. For the best Breeding Mare, for the same purposes—Five Sovereigns.

LXI. For the best Highland Pony for the saddle, not under four, and not exceeding seven years old, and not being more than thirteen hands high.—Five Sovereigns.

LXII. For the best pair of four year old Carriage-Horses, bred in Scotland—Twenty Sovereigns.

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LXIII. For the best pair of three year old Colts, for Agricultural purposes.—Ten Sovereigns.

MEMORANDUM REGARDING SWEEPSTAKES.

The List of such *Sweepstakes* as may be proposed, will, of course, be made up in the country; as it is impossible for the Directors of the Society to foresee what may be the department in which the vicinity of the Show happens to be best qualified to compete. The following may be suggested as a skeleton list, to be afterwards filled up, as circumstanes may suit.

1. Best Morayshire Bull, not less than three years old.
2. Best Morayshire Ox, } symmetry, fat, and weight.
3. Best ditto Spayed Heifer, }
4. Best Ayrshire Milch Cow, not under four years old.
5. Best Ayrshire Heifer.
6. For the best Pen of five Spayed Ewes, not under three shear.
7. For the best Pen of three Wedders, of any breed, cross with the Black-faced breed.
8. For the best Mare for road or field.
9. For the best Colt, under four years old, for road or field.
10. For the best Lot of three Highland Ponies.

Sweepstakes to close, and Nominations to be made to the Clerks of Counties immediately connected with the Show, to the Town-Clerk of Inverness, or to the Secretary of the Society at Edinburgh, before the first May 1831.

GENERAL REGULATIONS FOR THE SHOW.

1. The Competition will take place at Inverness, on Monday the 20th September 1831.

2. The Competing Stock must have been the property, and in the possession of the Competitors from the 1st January 1831; they must have been fed solely on farm produce, excluding distillery wash and grains.

3. The usual regulations of the Society, with respect to General Shows of this kind, in so far as applicable to the Inverness Meeting, and which will be published in detail in due time, must also be strictly adhered to.

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THE VETERINARY SCHOOL.

This establishment is now in its seventh year of operation, under the Lecturer appointed by the Society, Mr Dick, a Graduate of the Veterinary College of London, and its practical utility has been fully ascertained. Young men from various parts of the country have received instruction in the most approved and scientific modes of shoeing, in the anatomy and diseases of the horse, and other domestic animals, and in the best system of treatment and cure: several of these students have been sent up by Local Agricultural Associations, and others have attended on their own account. Such of them as have attended two courses, and have been found qualified, after examination by a Committee of medical gentlemen, have received Certificates. It may be interesting, also, to Members of the Society to be informed that Mr Dick occasionally delivers a Popular Course of Lectures, at a forenoon hour, to a class of gentlemen.

The Lectures and Demonstrations for the Session 1830 and 1831 will be commenced in November next, at the usual Lecture-room in Edinburgh.

By order of the Directors,

CHARLES GORDON, *Dep. Secretary.*

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